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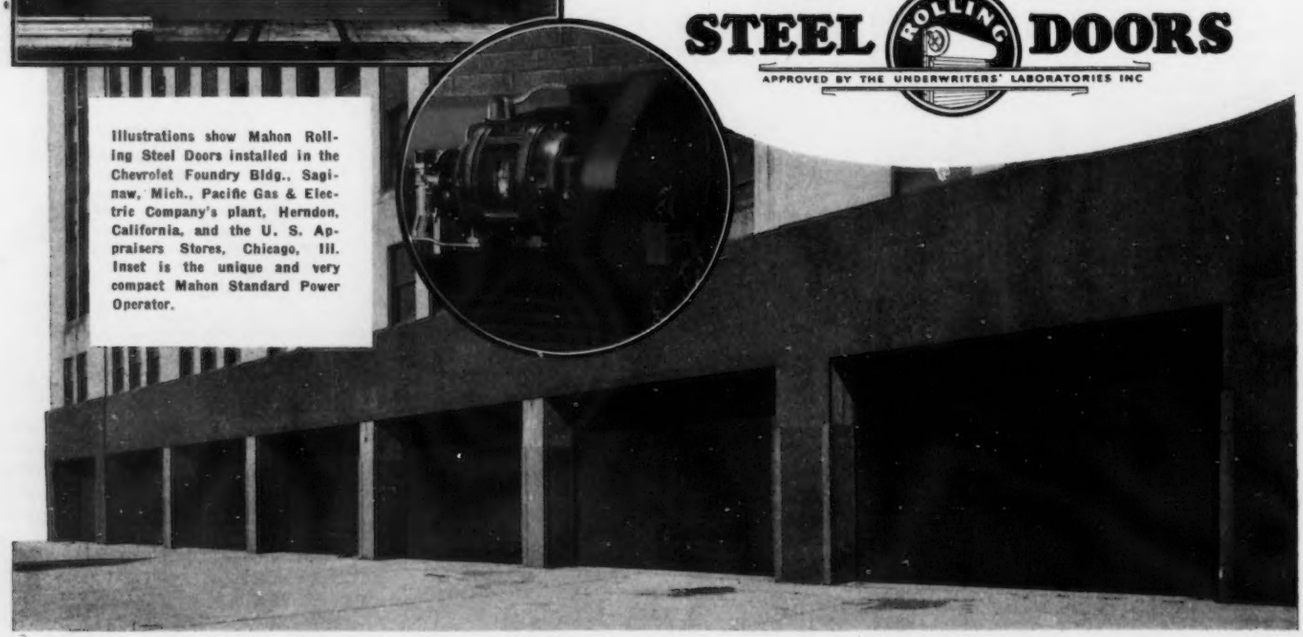

Illustrations show Mahon Rolling Steel Doors installed in the Chevrolet Foundry Bldg., Saginaw, Mich., Pacific Gas & Electric Company's plant, Herndon, California, and the U. S. Appraisers Stores, Chicago, Ill. Inset is the unique and very compact Mahon Standard Power Operator.

The Iron Age

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SEPTEMBER 19, 1940

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ESTABLISHED
1855

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Men or Machines?

THE other day I saw a man busily engaged in driving nails into a plank. Now, ordinarily, one would pass an instance of this kind by with little attention. But in this case, it aroused my curiosity because he was not nailing the plank to anything. He was just filling it full of nails.

So I stopped and inquired what he was going to do after he had driven all of the nails into the plank. "Well, mister," he said, "I am going to start pulling them out again"

That, it seems to me, is the position that we find ourselves in today.

Here we are turning industry upside down and almost inside out in order to make a changeover from peace products to war products. Here we are devoting most of our energies to building planes and guns and tanks and battleships which we hope we will never have occasion to use against anybody and that nobody certainly wants to have us use against them. And after the emergency has passed, as everything passes in time, we will all have to get busy reconverting our industries back to peacetime products and production.

By and large, it's harder to pull nails out of a plank than it is to drive them in.

It's harder to create new wealth than it is to destroy old savings. And that is exactly what we do when we embark upon war or the preparation for it.

We want and need to keep our industries in this country in a position of solvency so they can hire back the boys who go to war or who are conscripted for peacetime training. Also, we will need them to create new wealth to pay for what we spend for battleships and tanks.

Democracy cannot shoulder the burdens of what is going on today unless it puts itself upon a new and substantially lower cost level. It can do that in only two ways: by taking it out of men or by getting it out of machines. The latter way may save Democracy, the former will not. The latter is our way, the American way in a land of free men. The former is the dictator's way in a land of slaves.

J. H. Van Deventer

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Processing Trends In Powder Metallurgy

ARTICLES made of metallic powders are rapidly expanding as to scope of application and constantly improving in physical characteristics. Today, many articles are being made from powders more cheaply and better than by other manufacturing methods. This article points out this expanding application and lays down limitations. Data also are presented as to methods of making powders, manufacturing technique for the articles, and metallurgy and physical characteristics of the various metallic combinations.

By PAUL SCHWARZKOPF and CLAUS G. GOETZEL

President and Powder Metallurgist, Respectively, American Electro Metal Corp., Yonkers, N. Y.

THE technique of producing objects from metal powders, known as "powder metallurgy" or "metal ceramics," is a special field of metallurgical engineering which is becoming more and more important in industry. The process allows the production of solid metallic articles from finely divided metallic powders without subjecting them to a general melting and casting procedure. The powders are merely compressed at high pressures and subsequently or simultaneously heat treated at temperatures below the melting point of the main constituent in a way similar to that used in the manufacture of ordinary ceramics. In this way, metal powder compacts can be produced either as semi-finished or finished commercial articles, or as "sinter-ingots" suitable for a subsequent metal working process such as rolling, swaging, drawing, stamping, etc., which will ultimately yield wires, sheets, tubes and other special shapes and forms.

First attempts to produce solid metal bodies were carried out on platinum a hundred years ago, but this new art became successful only at the turn of the century, when it was adopted for the manufacture of refractory metals such as tungsten and molybdenum. These materials were so difficult to melt that the compacting and sintering method was the only solution to the problem. There followed a period of rapid development in manufacturing procedures which immediately found new applications in the production of tantalum sheets and other tantalum products, in the manufacture of hard metals and compound-contact metals and in the production of metal parts of lower melting metals and alloys. Today there are many articles made of metals and alloys, from tungsten and titanium down to aluminum, cadmium, tin and lead, which can be produced successfully from powders.

Present Uses

The first application, the replacement of an inconvenient or difficult casting process, has already been mentioned. The new method permits manipulations at much lower temperatures than necessary for a melting procedure, and even the highest melting refractory metals can readily be sintered by means of a relatively easily constructed apparatus, sometimes by using commonly employed furnace equipment. Tungsten, for instance, can be produced in wire form by pressing powder into bars and subsequently sintering by direct current resistance heating under protective atmospheres at temperatures far below the melting point. The sinter ingots obtained in this way are then worked down to rods which ultimately may be drawn to wires so fine they may be used for incandescent lamp filaments and heating wires in radio tubes. Such wires are known to have tensile strengths of from 500,000 to 600,000 lb. per sq. in.

The use of two or more different metal powders to produce composite metals retaining the individual characteristics of each constituent is another application. The so-called "heavy metal" which contains 90 per cent tungsten and the balance copper and nickel, is one example. When the different powders are mixed, pressed and sintered, the finished product has a density of about 17 and is suitable for balancing of parts, etc.

The electrical industry generally makes use of similar composite materials, known as "compound metals," to produce contact materials and welding electrodes which combine the resistance to fusion and volatilization at arcing temperatures of such metals as

molybdenum and tungsten with the high conductivity of copper and silver. Powder metallurgy makes it possible to incorporate these high melting metals in the lower melting conductors, and thus to reduce efficiently the tendency of these contacts to fuse without destroying conductivity.

One of the most important applications of powder metallurgy is in combining metals and non-metals. Many examples could be given. One is the production of "cemented carbides," which are used in the manufacture of high speed cutting tools. In this process, the powder of the heavy metal which is usually tungsten, tantalum or titanium, is combined with some form of carbon to produce the hard and brittle metallic carbide. Either cobalt or nickel is used as a bond or cement. When these binders are used, some toughness and resistance to shock is added to the extreme hardness of the carbides. Another application in this group is a copper and graphite combination which is used in the electrical industry for collector brushes. Recently new grinding and cutting tools have been developed by impregnating hard metal, nickel, bronze or other metal powder compacts with diamond dust. The metal compacts form a tough and somewhat ductile matrix in which the diamond particles are held in place.

Another very important advantage of metal ceramics is the fact that it permits the production of metallic bodies with a definitely controlled porosity. This has led to a rapid development of the so-called self-lubricating bronze bearings, one of the main products of non-ferrous powder metallurgy. Copper and tin, to which may be added small percentages of graphite, are pressed into bearing shapes, and these compacts are sintered in a protective atmosphere. The finished bearings possess a porosity up to 40 per cent by volume.

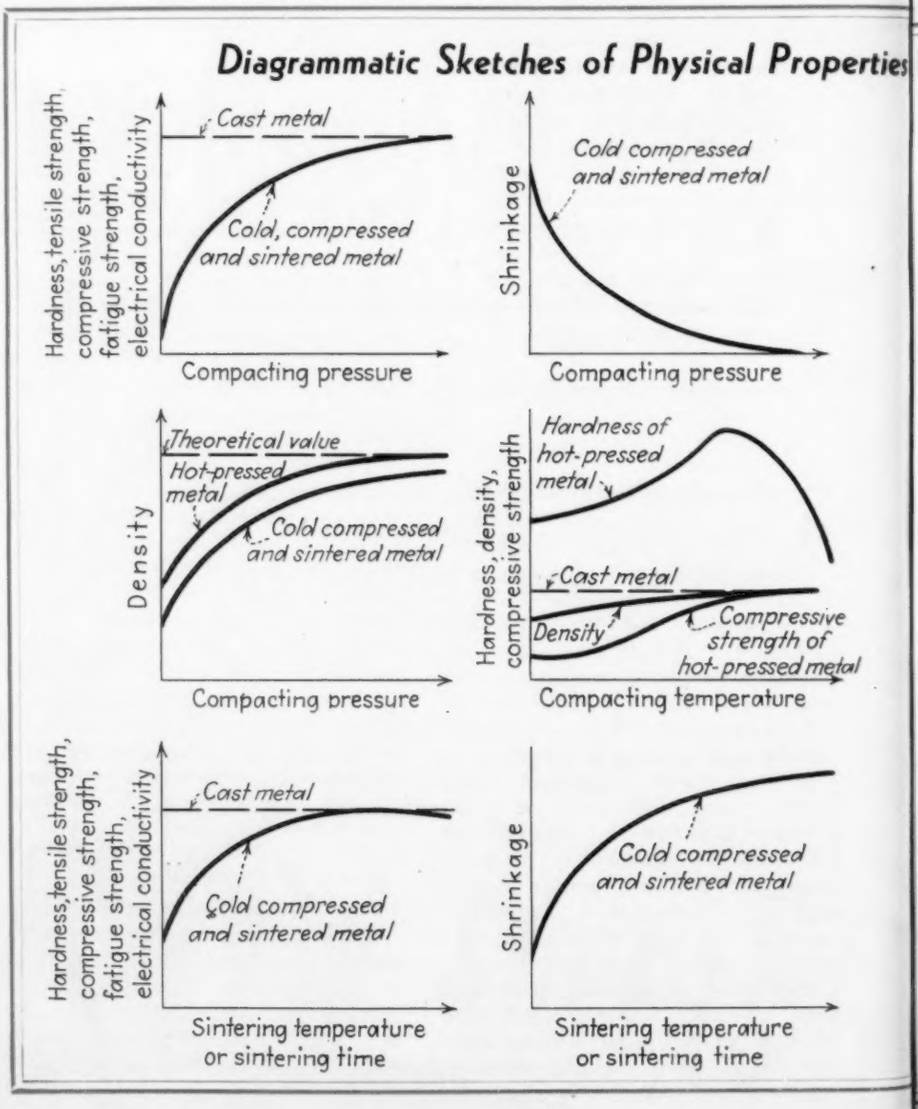
One of the most promising applications of powder metallurgy is the large scale production of small, standardized metallic parts. Since, in many cases, these parts can be directly compacted into their final shapes, the high costs of machining are saved. Recent progress in the developing and marketing of the necessary raw materials, such as iron and steel powders, is opening a great field of application in the automotive industry.

There are numerous other applications which can only be intimated in this paper. The ability to combine metals which are not miscible in the liquid or solid state to form uniform compacts has led to the development of copper-lead bearings. The relative ease of machining semi-sintered powder compacts has facilitated the manufacture of permanent magnets from metal powders, and the possibility of molding subsequent layers of different metal powders to form bi-metallic products may also open a new field of industrial application.

Processing Principles

There are a number of different methods for the manufacture of metal or alloy powders, the more important of which are mechanical disintegration, gas-reduction, electrolysis, precipitation, condensation and chemical displacement. Mechanical disintegration may be done by crushing, stamping or grinding. Powders thus obtained are prepared for processing by drying, reducing, mixing or ball milling. Various grades can be produced commercially and depend on the shape of particles, the screen analysis, the flow and the apparent density, all of which are important factors in governing the quality of the finished metal part.

The metal powder, whether alloy, plain metal or metal mixture, is usually fed into a steel die and compressed into compacted bodies. In some cases as with iron carbonyl the powder need only be fed and tapped into a mold or tube. The dies and punches are usually made of hardened steel to resist high pressure and require most accurate fitting. The molds are then placed in presses, either mechanical or hydraulic. Either hot pressing or cold pressing methods may be employed. Hot pressing is usually performed at such temperatures that a reducing atmosphere is required. This process sometimes eliminates the sintering operation because pressing and sintering are done simultaneously. This method is well worked out for the refractory metals but is relatively new for low-melting materials.



Cold pressing specimens are usually heat treated. This treatment is called sintering or annealing and develops a crystalline structure from the compressed agglomerate of powder particles which were previously held together only by adhesion forces. The metamorphosis of the powder compacts into metallic bodies is assisted by cohesion forces in the particles caused by their being strained during compression. On heating, the strains are released and recrystallization and, later on, grain growth play the main part in the conversion of the compacts into regular metallic bodies. The more closely the sintering temperature approaches the melting point, the more does the solidification of the compact advance until the structure of the ordinary material is finally approached.

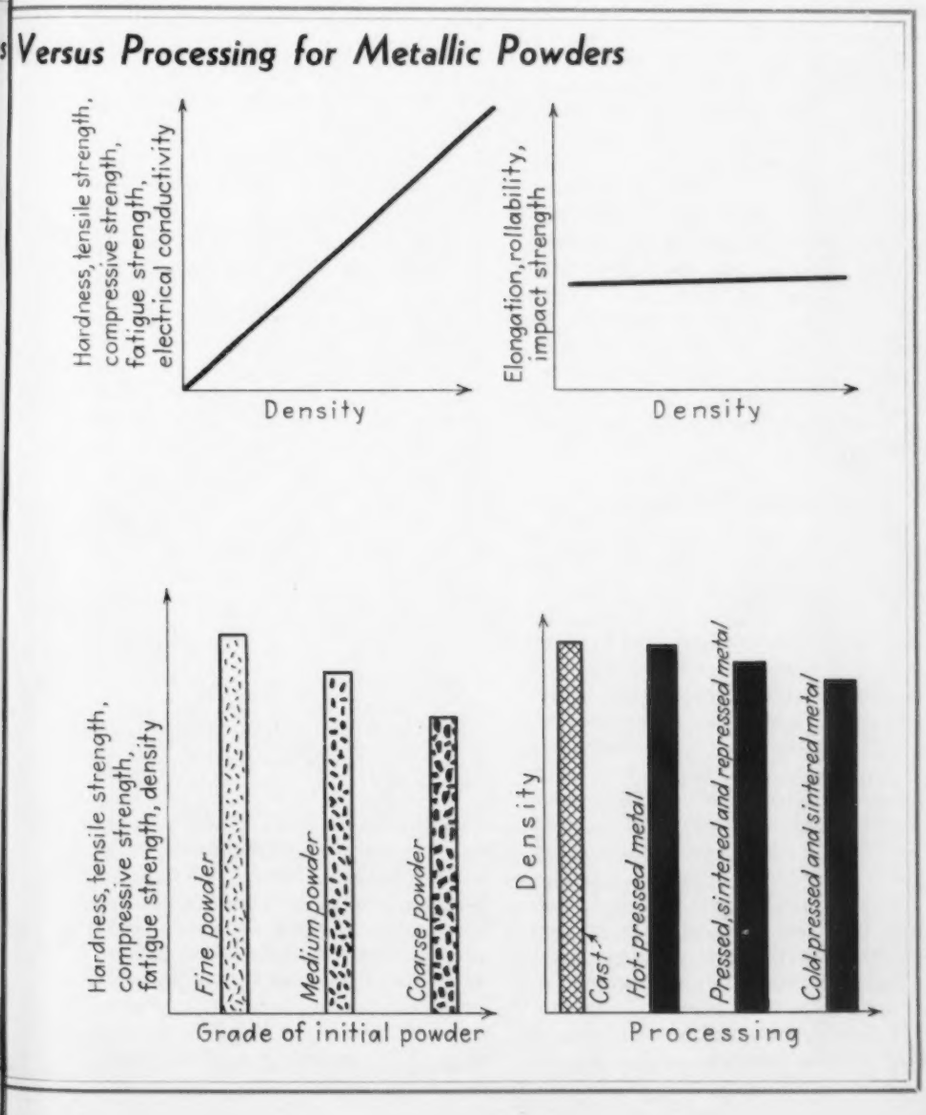
The sintering time as well as the rate of heating and cooling depends upon the material. Commercial sintering periods range from a few minutes to 24 hr. or longer. Generally speaking, sintering follows the diffusion laws for the solid state. A decrease in time necessitates an increase in sintering temperature to establish the same degree of metallization of the powder compacts, and vice versa. To avoid surface oxidation, a reducing or at least neutral, sintering atmosphere must be used. This may be a gas, such as hydrogen, carbon monoxide, dissociated ammonia or nitrogen; a vacuum; a liquid salt such as cyanide or a low melting metal. If the reducing medium is gaseous, it must be in a dry condition.

To increase the density and physical properties of the sintered metal, heat treatment of the compacts is often followed by subsequent working such as repressing or coining, forging, swaging, rolling, drawing, etc. Repressing is often employed for bearings and bushings and is done either in the original mold or in a different die to obtain the final shape of the piece. The applicability of repressing, which is not always essential or even possible, depends upon the material and the shape desired. Some materials expand or contract during sintering to such an extent that repressing becomes extremely difficult. Other working methods are in general use for the manufacture of lamp filaments, sheets, contact points, etc., from compacts consisting either entirely or substantially of refractory metals. They can also be successfully applied to lower melting metals, such as copper, iron and nickel and their alloys, in the laboratory research.

Metal Synthesis

During compression, the powder particles are brought so close together that adhesion forces come into effect. The greater the number of contact points established, the larger is the sum of the adhesion forces. Therefore, fine powders have a better adherence after pressing than coarse powders compressed at the same pressure. Briquettes compacted at a certain pressure from powders of soft metals, such as tin, lead or copper, are more rigid than compacts compressed at the same pressure from hard metal powders of the refractory metal and carbide group, because the soft metal powders are more plastic under the compacting pressure and provide more contact areas for action of the cohesive forces. On the other hand, the hard powder particles are not plastic and therefore result in brittle compacts, so that auxiliary cementing materials must be used.

The consolidation of the compacted powder particles is caused by the atomic mobility of the metal at elevated temperatures. The cohesive forces are replaced by an atomic interlocking and recrystallization takes place within the particles and at their borders to form new, artificial grain boundaries. With further rise of temperature, grain growth, caused by coalescence, results in shifting of the new grain boundaries and in the gradual disappearance of the old powder particle interstices. The more advanced this metamorphosis becomes, the closer does the compact approach the regular metallic state of an annealed casting of of the same metal. The grain size of the synthetic metal is usually much finer and can be controlled by the grade of the initial powder and by the temperature and the duration of heat treatment. In case of sintering of alloys or composited metals, inter-diffusion is another phenomenon which accompanies recrystallization and



grain growth. This inter-diffusion causes the type of bonding which is effected by the cementing action of a constituent which is molten at the temperature of the consolidating sintering operation.

Pressure when applied to the compact while cold will lower the recrystallization temperatures, but has only an indirect bearing on the final grain structure since it merely condenses the loose particles to more or less porous aggregates. The porosity remaining in these aggregates after compression partially governs the structure of the final compacts. Grain growth may close or change some of the cavities, but the extent is again largely dependent on the type of initial powder and on the kind of heat treatment.

It is natural that porosity has its effect on the physical properties of the final material. The type and shape of the individual cavities are of the greatest importance. Porosity originating from imperfect compacting is practically always present but can be partially controlled by changing basic conditions. The detrimental effect of this imperfect treatment on the qualities of the final compact is caused by the shape of the cavities which are usually angular but not infrequently continuous. Porosity developed during sintering due to gas evolution is of equal importance, although these "secondary" pores often have a more regular and usually spherical shape with less influence on the mechanical properties of the final compact. This secondary porosity is particularly favored by a fine particle size of the initial powder and by vacuum heat treatment.

With sufficient time permitted for complete expulsion of air entrapped during compacting and of gas adsorbed by the initial powder, the atomic forces during sintering at elevated temperatures will promote a shrinkage of the metallic sponge into a dense metallic body. This shrinkage will depend largely on the fineness of the initial powder and the temperature and duration of sintering. Although excessive shrinkage is inconvenient with regard to sizes and tolerances of the compacted bodies, it is the main indication of a successful consolidation of the powder compacts.

Impurities also have their effect on the degree of metallization and on the mechanical properties of the compacts. Three types of impurities may be distinguished: thin films surrounding the powder particles such as oxides or carbonaceous substances, small foreign particles of impurities usually found on the walls of angular cavities and already attached to the initial powder particles, and isolated inclusions such as silica or other oxides which cannot readily be reduced. In certain cases, the films of impurities are the most harmful, especially since they hamper or prevent the atomic mobility, grain growth and diffusion. This definitely is the case with the oxide skins on magnesium, aluminum and chromium powder particles, which are difficult to remove during sintering. However, there are cases known in which oxide films surrounding the particles or a slight amount of oxygen chemically bound in the main mass of the metal powder, are of beneficial influence. This is so in the case of tungsten. Oxygen-free tungsten cannot be sintered easily. On the other hand, powders with a small content of bound oxygen or with oxide film surrounding their particles are very suitable for the sintering process if it is carried out in hydrogen or in a hydrogen containing atmosphere. Hydrogen reduces the tungstic oxide to nascent tungsten with a high vapor pressure, which settles down on the original tungsten particles and provides an artificial bond to cement the particles together. The influence of the other types of impurities on the metallization and physical properties of the compacts will probably depend on their quantity, their character and their distribution. Impurities such as silica, thoria, alumina, magnesia, lime, etc., which are not reducible in hydrogen at common sintering temperatures, have a marked influence on the physical properties of the final products, even if the impurities are present only at the grain boundaries in small amounts.

Properties of Compacts

The properties of the powder compacts are strictly dependent on the state of the briquettes and on the history of their processing. It is logical that briquettes, agglomerated by pressure but not subjected to any heat treatment, have characteristics different from those which have been sintered, and that those which were only slightly compressed before heat treatment have properties other than compacts which were subjected to high pressures before heat treatment or were pressed and sintered simultaneously or even severely worked after heat treatment. Probably the greatest influence on the final qualities of the compacts is exerted by the specific material used as basic powder. One cannot expect that a lead powder compact will yield a hardness similar to cast iron or chromium or that a chromium or titanium powder compact will have a ductility comparable to that of cast copper.

Nevertheless, it might be justified to make an attempt to generalize the trend of the properties of compacted metal powders on the basis of research data so far as known. Most of the information must be derived from the refractory metal and the cemented carbide field, but there is available sufficent information from the field of lower melting metals and alloys to allow certain generalizations and conclusions to be made.

Compacted but not heat treated metal powders are very brittle and weak. They are the stronger, the higher compressed and the softer their initial powder is. The strength is a direct function of the adhesion forces between the particles. Hardness of these compacts is governed by the degree of strain hardening of the powder briquette during molding, by the natural hardness of the metal and by the degree of density of the compact. The density, on the other hand, is chiefly influenced by the compacting pressure, but also depends on the plasticity of the powder and the size of the particles.

The more advanced the heat treatment is, the more nearly do sintered metals approach the state of annealed metallic castings of the same material. With increase of compacting pressure, sintering temperature and sintering time the static properties may approach the values of the ordinary metal, or in some cases may exceed them. The same holds for other physical characteristics such as density, electrical and heat conductivity. Malleability and ductility are also influenced by the same factors but to a less marked degree since they are main functions of the conditions at the artificial grain boundaries. For this reason such properties as rollability or tensile elongation, reduction in area or drawing ability cannot be considered as "density controlled" properties, whereas the static properties of sintered metals may well be classified under such terms. Dynamic properties such as impact resistance show behavior similar to ductility and malleability.

The properties of compacts which are pressed and sintered simultaneously have not as yet been studied as thoroughly as those of bodies which are first compacted and then sintered. However, it is known that the static properties are much easier to improve and much faster to bring to a maximum if this method is used. Evidently,

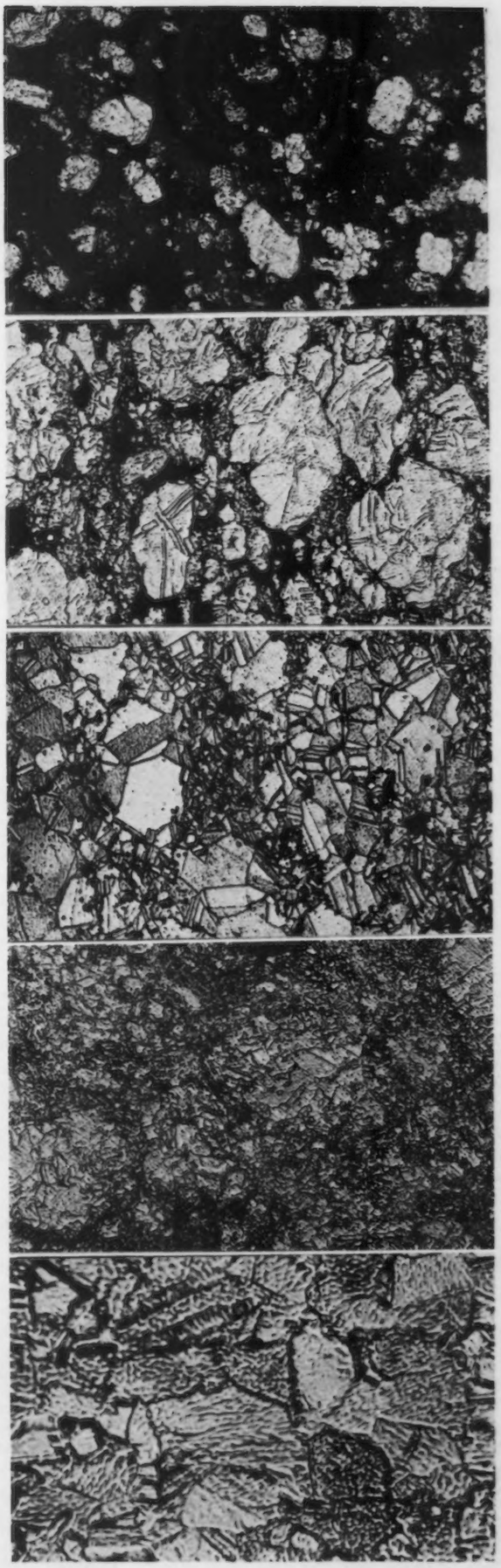
the combination of pressure and heat results in a reinforcing effect on each other, and the metamorphosis of the compacts is achieved at lower temperatures in much less time The improved plasticity of the hot-pressed briquettes permits density to approach its theoretical value, thus diminishing the detrimental porosity and granting an intense atomic action between neighboring particles or between newly formed grains. This not only affects beneficially all "density controlled" properties, but also very likely improves static elongation and dynamic impact resistance.

Very remarkable is the great hardness of powder compacts which are compressed at high pressures when heated to a temperature slightly below the recrystallization temperature. This hardness is in excess of the values obtained for the same compacts pressed at room temperature, and may far exceed hardness values of ordinary material severely strained by cold work, if the initial metal powder is of a very fine grade and if the material belongs to the class of soft and ductile metals.

Present Limitations

Powder metallurgy of today has limitations in several directions which apply to most of its operations. First is the question of economy. Metal powders are as yet more expensive than cast metal ingots. As a result, a sintering process which is absolutely necessary and economically sound as in the manufacture of parts made from tungsten, molybdenum or their carbides, may be entirely out of the question in the case of small, inexpensive steel or brass parts for the automotive or general machinery. The question of equipment cost is of equal importance. The powders are molded into suitable designed dies. These dies must be strong and well built. Since high pressures of the order of 30 to 60 tons per sq. in. and higher, are used, it is necessary to employ powerful and expensive presses. The unit compacting pressure may be considerably reduced by the application of heat during pressing, thereby taking advantage of the better plasticity of the metal powders. However, the necessary dies must be constructed of special heat-resisting steels which, again, are more expensive. In this case, also, unit production rates will be much slower than in the case of cold compacting and subsequent sintering, because the time of the heating and cooling cycle of each compression must be considered.

Another limitation is largely mechanical. The size of the compacts is



A

Commercial copper powder. At 75 diameters.

B

Same powder as above compacted at 50 tons per sq. in. at 200 diameters.

C

Same powder compacted and sintered at 750 deg. C. for 16 hrs. in hydrogen. At 200 diameters.

D

Same powder hot-pressed at 400 deg. C. at 50 tons per sq. in. At 200 diameters.

E

Sintered copper powder compact of C after cold rolling and drawing to wire. Annealed. At 1000 diameters.

controlled by the capacity of the presses which is, of course, limited. Furthermore, the size of the specimens is also limited by the compression ratio of the particular powder which might fall in the range between 2:1 and 20:1. Since metal powders do not behave as perfect liquids under pressure due to the friction between the particles themselves and between the particles and the die walls, the shape and size of the final compacts is confined to certain more or less simple configurations. The depth of the briquettes particularly is controlled by these factors.

Thermal limitations also are to be considered. Certain oxides, that of tin for example, are known to be reduceable only at temperatures well above the melting point of the metal. Consequently, tin powder particles, once they are enveloped by oxide films, will maintain these films during sintering which must be carried out below the melting point of the metal. The films, however, have a most detrimental effect on the rate of metallization of the compacted powder aggregates and are probably the chief reason for the poor sintering ability and extreme brittleness of such low melting powder compacts as tin, bismuth, cadmium, lead and zinc.

Finally, there remain certain basic limitations in the characteristics of the finished compacts themselves. Most of these limitations are closely connected with the degree and type of porosity in the compacts, or with the particular conditions at the newly formed grain boundaries. Porosity cannot be avoided if the customary sintering procedure is carried out, but can be considerably reduced if pressure and heat are supplied simultaneously during the molding operation. Porosity limits all static, or "density-controlled," properties, but this limitation can be overcome by a close approach of the apparent density of the sintered compacts to the theoretical value. Tensile elongation and impact resistance, however, are generally low, since these properties are mainly controlled by the specific conditions at the grain boundaries.

New Possibilities and Trends

More rapid advance in the field of powder metallurgy may be expected as careful research and development work overcome some of the obstacles already mentioned. In the future, powder research will cover many fields. The raw materials from which the powders are prepared will be improved so that the resulting products may be more carefully controlled. The regulation of compacting and heat treating equipment will be improved and hot-pressing will become an industrial possibility. Further work on continuously operating machinery will be done and unit equipment for compacting, heat treatment and metal working, will be developed. And, finally, advances will be made in converting the raw sintered compacts into refined, semi-wrought material.

At present, the use of pre-alloyed powders as basic material is being rapidly developed. (G. J. Comstock, *Metal Progress*, 35, 1939, p. 343.) The advantage of their use is evident. Sintering time can be considerably reduced and the promotion of secondary porosity by gas evolution due to the reaction of the ingredient metals can be avoided. Also the expansion of the compacts during heat treatment can be greatly limited. Alloy powders are obtained directly from the raw material by the reduction of ores which contain the alloying ingredients, by spraying or atomizing the molten alloy, by direct electrodeposition of the alloy powders, by subjecting a metal powder to a chemical displacement process, by subjecting a mixture of the individual metal powders to a pretreatment which will refine the powders and will promote inter-particle diffusion, and by the use of a foreign gaseous phase in the heating chamber. A method for converting iron ore powder into a soft, compressible carbon-steel powder is described in U. S. Patent No. 2,175,850. The other methods just mentioned are suitable for the production of many commercial non-ferrous alloy powders.

The raw material problem naturally is closely related to the type of powder production. Recent development work on iron powders (L. L. Wyman, *Metal Progress*, 35, 1939, p. 585), is only one example of the careful and methodical attack to develop basic materials for powder metallurgy which are inexpensive and still good enough to allow competition between the sintered articles and machined parts or die castings now commonly used. A sufficient purity of the powdered ore concentrate and a proper conditioning of the resulting metal powder are of primary importance for producing final products of good quality. Removal of impurities and close check on the powder particle surface conditions are basic necessities which cannot be overlooked during the early stages of processing.

The development of better controlled equipment may be considered a natural consequence of time, and there is little doubt that many of the mechanical obstacles, as mentioned above, will be overcome in the near future. Standard powder metallurgical processing equipment will become less expensive the more the experience and skill in die making and building of metallurgical equipment advances. The introduction of the high-frequency induction current for powder work hold great posibilities for the development of the heat treatment end of the processing problem.

The acceptance of a hot-pressing procedure for lower melting powder metallurgical objects is probably of greatest significance. This procedure is well known and successfully used in the metal carbide field and the indications are that with a certain skill the method can well be used industrially for lower melting metal powders. After the establishment of reliable research data on the influence of pressure and heat on the increase of the plasticity of certain metals and alloys, the problem of selecting and designing the proper die material should not offer many serious difficulties.

It has already been stated that the physical properties of the final product depend largely on the character of the grain structure which has developed during the application of heat. As a matter of fact, the importance of heat in the formation of the artificial bonds of sintered bodies is similar to that in the development and maintenance of the inter-crystalline bonds of a cast metal. G. J. Comstock, discussing the question of the bond, defends the hypothesis that cooling from the plastic to the solid state is apparently sufficient for the propagation of atomic bonds between contacting metal particle surfaces, whereas for cast metals inter-crystalline bonds are initially produced by cooling from the liquid through the plastic to the solid state. Cemented metallic bodies with a constituent molten at the sintering temperature take an intermediate place between the regularly sintered bodies, which are completely in the solid state, and cast metals. Comstock's view is that bonding between solid metal particles and a molten metallic cement seems to depend upon the metallicity and partial solubility of the unmelted constituent. Therefore, solution or alloying, involves the formation of new atomic arrangements and fulfills conditions similar to those present during the formation of the initial inter-crystalline bonding of cast metals.

For these reasons a direct comparison between sintered bodies and castings seems permissible and general metallurgical practice applied on cast

ingots may also be employed on sintered metals. In other words, it can be expected (and is already proved in the case of the ductile refractory metals) that a refinement of the grain structure by the application of work will be of great significance for sintered metals in general. The importance of this conclusion has been recognized in the refractory metal field since its earliest existence, but its logical transfer to all other branches of powder metallurgy has started only recently when it became evident that the typical brittleness, shortness in tensile elongation and weakness in impact resistance of ordinary sintered metals was too great an obstacle to be overlooked or discounted.

The recently developed practice of applying a kneading operation to the metal powder while it is being compacted, opens a great field of research. The adoption of standard metal working methods such as swaging, rolling, forging and drawing, will be comparatively easy and the experience gathered from the ductile tungsten, molybdenum and tantalum metal manufacturers will be most valuable for a satisfactory processing of other powder metallurgical materials. However, the final success of this new processing scheme will depend largely on the possibilities of incorporating the metal working process in the general processing cycle in order to guarantee continuous operation. New development work will be done on the building of equipment units which will include pressing, heating and working the material. U. S. Patent No. 2,148,040, for instance, gives an excellent method. The sintered or hot-pressed powder compacts are subjected to an extrusion process which refines and condenses them, and finally converts them into a wrought-like state.

Future Applications

An expansion of the field of appliciation will depend largely on successful solutions to the many problems indicated in this paper. The development of babbitts from metal powders will depend on the successful application of hot-pressing and the removal or complete avoidance of oxide and other impurity films around the powder particles. The latter will also be a basic condition for the successful development of aluminum and zinc alloys as substitutes for die castings. Commercial hot-pressing will open the door for the manufacture of high-duty copper alloy parts, such as washers and bushings, and, last but not least, for the industrial development of strong and tough iron and steel parts from metal powders, a development which has been eagerly awaited for years. Other possibilities may be found in the development of ductile wires from brittle metals such as titanium, or of electrical resistance elements such as iron-chromium, nickel-chromium and other alloys. And, finally, the refractory metals may find many new uses in the production of new tool metals, electrical contact metals and wear resistant parts.

Hypercarb Process of Gas Carburizing

THE hypercarb process of the Continental Industrial Engineers, Inc., Chicago, was described by W. A. Darrah at the 100th meeting of the American Chemical Society, Detroit, Sept. 12. The process serves to apply a controlled high-carbon case on steel articles. It depends on treating steel articles at controlled temperatures for controlled time by an atmosphere containing hydrocarbon and carbon monoxide in controlled percentages.

Following extensive tests by Continental on the carburizing process and a muffle made of refractory material, a study was made on the possibility of pretreating and preactivating the gases for carburizing.

As far as is known this was a new field and has given very interesting results. It was found that by heating the carburizing gases to temperatures of the order of 1600 deg. to 1700 deg. F. prior to permitting them to come into contact with the steel being treated, a very rapid carburizing action was obtained and the gases acted in many respects as if they were much more active than unheated gases.

A further interesting result was the fact that the gases thus pretreated did not deposit carbon scale or soot on the steel being treated and it was possible by the proper pretreatment of the gas to bring out steel articles which would be entirely clean and bright while having a decided carburizing effect on the surface of the article.

A further study of this process seems to indicate that the preheating of the carburizing gases developed especially active compounds most of which appeared to contain carbon monoxide in some form.

It was further developed that the action of free carbon such as soot or coke depositing from the carburizing gases was very slight in combining with the steel.

The general results of this investigation tended to indicate that the carbon which combines with steel under ordinary practical temperatures and working conditions is usually in the form of combined carbon monoxide. Indications were present that carbon monoxide formed intermediate compounds with iron, nickel and some other metal and that these intermediate compounds act as a carrier.

The net result of the investigation was to develop a commercial process which is now operating in an automobile plant. The process is quite rapid and gives absolutely clean and uniform surfaces with controlled carbon contents.

It is possible to run the carbon contents on the surface as high as 1.2 per cent of carbon. By controlled soaking time and controlled gas composition this may be reduced or increased at a depth of the case controlled at will, according to Mr. Darrah.

Aluminum Job Shop

—Where aluminum dreams are translated into fact. Described here are some of the historical innovations in the fabrication of aluminum.

ASK an aluminum technician to name five interesting types of aluminum manufacture and fabrication, and chances are that he would glibly mention casting, forging, rolling, drawing and extruding. Most likely he would forget all about the work that is being done in the jobbing division, at the oldest plant of the Aluminum Co. of America at New Kensington, Pa.

In the jobbing division articles are made which cannot, for one reason or another, be fabricated in any other department of the company. It is a progressive department in which aluminum dreams are translated into fact. Many an aluminum success was first developed there. For the past 32 years the company personnel has known it as the "job shop," and the functions of the job shop date back much earlier. They began when, for the first time, the company *fabricated* an aluminum article for a customer. Company historians place this date somewhere around 1895.

The company had been founded in 1888 under the name of the Pittsburgh Reduction Co., and its original intention had been to manufacture such semi-fabricated products as ingot aluminum, castings, sheet, rod, and bar. According to the plan these were to be made into finished articles by other manufacturers.

But in a world obsessed by the "aluminum fever" the plan did not work. The "aluminum fever" was a fanciful industrial disease quite common in the nineties. Its victims believed that almost anything could be made successfully of aluminum. The new metal was one of the most precious gifts of science to the nineteenth century, and enthusiasm over its light weight, its high resistance to corrosion, and its high heat and electrical conductivity knew no bounds.

It must be recalled that aluminum was not always the inexpensive 18c.-a-lb. metal it is today. Aluminum was not even known prior to the day in 1825 when Hans Christian Oersted, a Danish scientist, made the first globules of aluminum. Its cost, because of expensive reduction methods, was exceedingly high. In 1852, for instance, a pound of aluminum sold for $545. Improved production methods had brought this price down to $8 per lb. by 1885, but this was still far too high to allow aluminum to be used in quantity.

Charles Martin Hall, a 22-year-old Oberlin College graduate, discovered an electrolytic process by which aluminum could be made inexpensively. He brought his invention to the attention of a group of Pittsburghers, who founded the Pittsburgh Reduction Co. in 1888 to exploit Hall's patents.

In a few years the "aluminum fever" began. Joseph Allison Steinmetz, of the Philadelphia firm of Jamey and Steinmetz, wrote in the October, 1900, issue of *Aluminum World*: "The great, new, white metal, aluminum. Houses, bridges, and locomotives to be built of it. Iron and steel, metals of the past, with the great 'Aluminum Age' drawing upon us!" Steinmetz may have appeared to his contemporaries as an incorrigible visionary, but time eventually corroborated many of his predictions.

There was so much to be made of aluminum! Independent fabricators, however, were reluctant to assume the responsibility of development, and although the Pittsburgh Reduction Co. stood ready to give every amount of technical advice possible, not much progress was made at first.

The world of industry, however, demanded aluminum, and soon learned to beat a path to the door of the Pittsburgh Reduction Co. By 1900 a number of fully fabricated products were made in the machine shop of the New Kensington works.

The company then formulated a policy to which it has generally adhered in the past 40 years. It would develop a product and then share the fabricating experience thus gained with interested responsible firms.

The manufacture of aluminum cooking utensils was the first—and is also one of the best—examples of this policy. While the company never gave up the manufacture of aluminum cooking utensils after they were once developed, it served to popularize them to such an extent that scores of companies are now doing a flourishing business making aluminum cooking utensils. Some of them have even enlarged their activities to the point where they manufacture other aluminum commodities, such as sheet.

A chronology of job shop activities shows that as early as 1901 interior panels, brackets, and moldings were made there for the Interborough Rapid Transit Co. Real impetus came at the end of the year, when a number of

automobile bodies, among them White, White Steamer, Peerless and Pope-Toledo, were constructed of aluminum at the job shop.

By 1904 more than 100 men were employed in the automobile department alone. In 1912, the Ford Motor Co. standardized on aluminum hoods, and as many as 3000 of them were made at New Kensington in a single working day, and the Ford hood was one of the principal products of the shop for several years.

"Can you weld aluminum?" is one of the questions frequently asked of aluminum engineers. The question was first posed to the job shop in the initial years of the present century, and the technique of gas welding was developed. The job shop went further, so that today other forms of welding aluminum, such as spot, seam, and resistance welding are commercially practicable.

By 1914 the activities of the job shop had expanded to such an extent that the erection of a new building was necessary. It was a two-story structure, amply large to accommodate the augmented force and additional equipment. Soon, however, working space was filled to capacity, a condition partly accounted for by the British and Belgian war orders for steam-jacketed kettles.

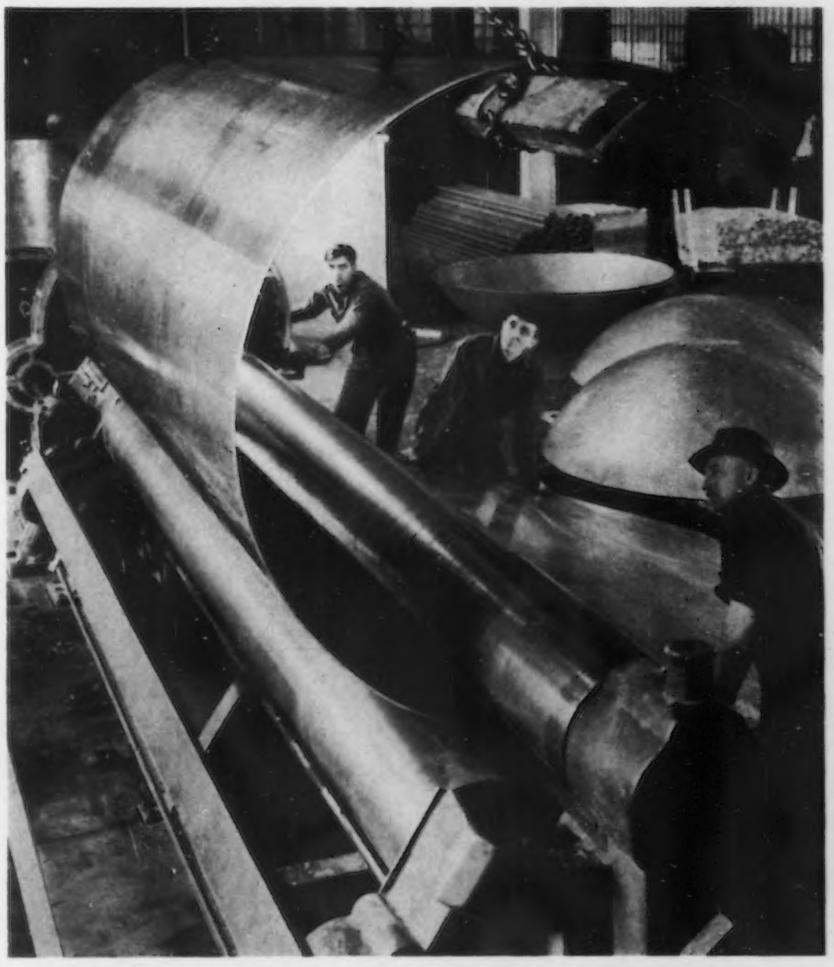
In this same year orders were recorded for varnish kettles and shipping drums. Rayon spinning buckets, of which so many are now of aluminum, were first made in 1914. Aluminum running boards were made for the Studebaker in 1915, and later that year the shop went into production on Marmon hoods, fenders, dust pans, and gasoline tanks.

In 1917, the facilities of the job shop were devoted almost exclusively to the manufacture of military supplies, airplane parts, and equipment for wartime chemical industries. After the war, when rayon began to come into its own, aluminum perforated spinning spools and cake centers were made.

A very striking example of the manner in which a product was developed by the job shop may be seen from its venture into the manufacture of aluminum furniture.

The late R. B. Mellon, president of the Mellon National Bank at Pittsburgh and once president of the Aluminum Co. of America, had become thoroughly infected by the aluminum

THE first tank car made of aluminum was built for the Cleveland Cliffs Iron Co. in 1927. The car, used for the transportation of acetic acid, was made up in the job shop of the Aluminum Co. of eight tank sections, since it was built prior to the Interstate Commerce Commission's approval on a standard constructed single tank car in aluminum. Two others of similar design were made at the same time and have now seen 13 years of service. They are in good condition and are expected to last at least 10 or 15 years longer.



THE start of a large aluminum tank as made in the job shop. A section of aluminum plate is put through a bending brake and given the proper curvature, and then the heads, shown in the background, which have been previously spun to size, are welded on.

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A GROUP of all-aluminum heat exchangers built in the job shop for the petroleum industry. Aluminum tubing was expanded into circumferential grooves cut into header plates.

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fever. To him is due the credit for first thinking about aluminum furniture. He also gave the job shop the first order for aluminum furniture. When his bank moved into new quarters in 1924, the banking floor of the new building contained 100 aluminum desks and 300 aluminum chairs.

The lightness of the chairs, their easy portability, and their sturdiness (all joints are welded, thus no chair can ever become loose or creaky) made an instantaneous hit. The Philadelphia Free Library ordered 700 aluminum chairs, followed by an order for 1000 dining car chairs by the Pennsylvania Railroad. This instantaneous success caused the Aluminum Co. to approach various manufacturers of furniture, suggesting that aluminum furniture had a future and that this future could be assured by an intelligent development, manufacturing, and selling campaign in which the Aluminum Co. would give the other concerns all possible help in developing the proper type of aluminum seating. Negotiations went on with a number of responsible firms, but their answers invariably were in the negative.

Rather than give up the idea because of these early discouragements, the Aluminum Co. decided to go into the manufacture of aluminum furniture itself. Sufficient room for manufacturing operations was not available in the job shop, so the coupany leased a plant in Buffalo, N. Y., bought the necessary manufacturing equipment, designed a line of furniture, and organized a sales force.

That was in 1927. By 1930 more than a million dollars' worth of aluminum furniture was sold annually. The General Fireproofing Co., Youngstown, Ohio, a leader in the manufacture of office furniture, soon saw the trend and added a plant building for the manufacture of aluminum furniture. In 1934 it acquired the Aluminum Co.'s equipment and extended its interests in aluminum furniture. Since that time General Fireproofing has consistently sold several million dollars' worth of aluminum furniture each year.

Coincident with the development of furniture came that of ice cube trays and grids, with a result that astonished even the most optimistic. For today the use of aluminum trays in refrigerators is practically universal.

Not all stories of the job shop are success stories, however. It has been known to lay an occasional egg. There is the case of the aluminum shingle, on which so much development work was done. The aluminum shingle, for a number of reasons, was impractical, and it was eventually given up. Not that aluminum in itself didn't make a good roof—the roof of the Church of St. Joachim in Rome, for instance, is aluminum and has been giving an excellent account of itself for more than 40 years—but difficulties in sales, manufacture, and price were such that the aluminum shingle had to be abandoned.

Contrast this failure with the success of the aluminum beer barrel, another job shop development. Aluminum barrels were a new thing in this country seven years ago. They derived their origin from the fact that the supply of wooden barrels was ex-

hausted after the repeal of prohibition, and an adequate number of beer packages was necessary to the mushroom revival of an old industry.

Metal barrels were in demand overnight. The growth of the aluminum barrel was slow at first, but during the past two years this type of container has become so popular that many important breweries have bought aluminum barrels by the thousands.

The building which housed the job shop again became too small, and in 1936 a new three-story building, with floor space in excess of 80,000 sq. ft., was erected. Steam-jacketed kettles and other large spinnings are made on the first floor. The second floor is devoted to general fabrication. On the third floor large tanks and chemical equipment are made. The old shop is reserved for the manufacture of aluminum beer barrels and for spot, seam, and resistance welding.

Constant attention to the problems of welding brought results to the job shop. In 1930, for instance, it was possible to spot weld two sections of aluminum each 0.1 in. thick. Today, the technique of spot welding aluminum has been increased to the point where the maximum possible thickness of such sections is 3/16 in.

Jobs of special interest which were made in the job shop in 1937 included two field-erected storage tanks, largest ever built in aluminum. Each has a capacity of 168,000 gal.; each is 35 ft. high and 24 ft. in diameter. In the same year synthetic resin kettles, of high purity aluminum, were made in the job shop. They were designed to operate under a full vacuum at 600 deg. F.

Marine applications of aluminum have been of interest for years. Anticipating an increase in this interest, the job shop constructed three 16-ft. sailboats of aluminum last year. Made from designs of W. Starling Burgess, whose drafting boards produced the last three winners of the America's Cup, the hulls of these three boats weigh only 217 lb. each — approximately half the weight of a wooden boat of similar size. Their entire weight, including mast, boom, sails, rigging, gear, floor boards, and seats, is less than 300 lb.

A recent development of the job shop is the perfection of aluminum brazing technique. Brazing aluminum was impossible a few years ago, but by earnest study and experimentation a field has been opened to aluminum fabricators from which they will without a doubt realize tremendous advantages. The joining costs in brazing are considerably less than those obtained with standard gas or arc welding, the joints are neater and require less finishing, and the process permits joining of parts that are too thin to be welded. The new process is expected to mean as much to the aluminum industry as all types of aluminum welding meant only a relatively few years ago.

Such, in brief, are some of the many developments pioneered or perfected by the job shop of the Aluminum Co. of America in the long period of its existence. The importance of this division of the company has been well established—so much so that it will always play a major role in the development of aluminum, and thus provide industry with constantly improved products and processes of a very necessary material.

PUTTING the finishing touches to the conical bottoms of a number of large aluminum oil processing tanks. These tanks, which are more than 11 ft. high and have a diameter of 90 in., are used in the processing of oils which are used in the manufacture of paints and varnishes. The tanks are equipped with a heating coil in the bottom and a special type of inlet distribution pipe at the top.

Grading Abrasive Sticks

CONSIDERABLE interest has been aroused in recent months as to the method of grading fine abrasive sticks by a modified Rockwell hardness test. The technique was first presented in THE IRON AGE, April 25, by E. L. Hemingway of the Foster Machine Co. Mr. Hemingway later presented the same material before the Society of Automotive Engineers at Worcester, Mass., May 8. Mr. Milligan's article was presented as a prepared discussion at the same meeting and has since been published in the *SAE Journal*. It is printed here largely to present to the same reader group, the viewpoint of a manufacturer of abrasives so that both sides will have been heard. The reader is also referred to the article in the Aug. 22 issue of THE IRON AGE on "The Gillette Abrasive Stone Comparator," by David H. Harris.

The Rockwell method of grading, honing and superfinishing sticks with the Rockwell hardness tester as proposed by Mr. Hemingway is interesting and appears to have possibilities. However, the technique should be carefully used within certain limits which will be pointed out in this discussion.

Norton Co. has done and is doing considerable work connected with the grading of bonded abrasive products. The use of the term "grading" in this connection means a determination of the strength of the bonding which holds the abrasive grains together to form the abrasive article. The study of the Rockwell method at Norton shows that the results obtained on soft grade vitrified products of fine grain size, such as superfinishing sticks, check satisfactorily with our other methods of grading.

From the author's point of view, however, the Rockwell test does not give any new or different information from that obtainable by other grading tests carried out at Norton. On the other hand, the Rockwell test is a quick and easy one to apply, and the general availability of Rockwell machines opens up the possibility of grading determinations being readily made by the user of abrasive products.

Structure Defined

In order to understand the significance of Rockwell determinations on bonded abrasive products, it is necessary to appreciate something of the structural nature of these products. For example, a vitrified bonded superfinishing stick of soft grade is very porous and may actually contain one-half of its volume in the form of interconnecting pore spaces. The remaining 50 per cent of its volume consists mainly of abrasive grains, with only a small percentage of bond holding them together.

Organic bonded abrasive products may be of quite a different structure. Those bonded with such materials as shellac or rubber compositions usually are essentially non-porous, and all the spaces between the abrasive grains are filled with the bond material.

In actual surface abrasive operations, the action of vitrified bonded abrasives and organic bonded abrasives is usually found to be quite different. In the vitrified products, pores are available through which lubricant and coolant may pass and into which metal chips and grinding swarf may penetrate. The vitrified bond itself is rigid and non-plastic, and is substantially unaffected by the heat of grinding or by the coolants and lubricants employed.

On the other hand, with organic bonds that contain no pores, a considerable amount of the weaker organic bond is more or less in contact with the metal being surfaced. Often these organic bonds are softened by the coolants and lubricants employed. Furthermore, they are quite susceptible to heat generated in abrasive operations, and release of dulled abrasive particles often takes place as a result of the effect of heat on the bond.

In abrasive operations, the mechanical stresses involved, which are the cause of the abrasive grains being worn away or torn out of the surface of the abrasive product, we now consider to be resolvable into compressive stresses and tensile stresses. In varied types of abrasive operations the relative involvement of compressive stresses and tensile stresses may be quite different.

If this last statement be admitted, then its corollary is that both tensile and compressive characteristics of abrasive bodies must be known in order to predict their performance in use. These characteristics must be "weighted" in a manner similar to the degree of their involvement in the particular abrasive operation being considered if the action of the abrasive product in use is to be properly predicted.

What Rockwell Test Measures

When a vitrified bonded abrasive product is tested with the Rockwell machine, the deformation under the penetrator takes place largely because non-plastic abrasive grains and bond are crushed, and the crushed fragments fill up the adjacent pore spaces of the article. This test then measures the compressive force required to disrupt the bond posts and push the abrasive grains into the pores of the article. If the pores contain anything else besides air, then this material, even though it may have no strength of itself, will interfere greatly with the Rockwell penetration and will increase the apparent Rockwell hardness of the article much beyond its effect on the grinding performance of the product.

Non-porous organic bonded abrasive products deform differently under the Rockwell penetrator. Their bond possesses plastic properties, but their abrasive grains do not. The bond is therefore plastically displaced to a certain degree and the abrasive grains move around. The absence of pores increases the apparent hardness of the product considerably. Any effects of heat on the bond properties are not evaluated in the Rockwell test which is done at room temperature, although heat is generated in abrasive operations and is likely to influence the way organic bonded products perform.

In both of these examples, the Rockwell determination represents a test in compression only. It is therefore not capable of evaluating the tensile characteristics of the abrasive products, which characteristics are also involved to different degrees in various abrasive operations.

—by the Rockwell Test . . .

By LOWELL H. MILLIGAN
Norton Co., Worcester, Mass.

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The Rockwell determination made with an ⅛ in. diameter steel ball displaces only a very small volume on the surface of the abrasive stick being tested. It is therefore necessary to make a number of such determinations at different positions on the stick and average them in order to get a reliable result for the average grade of the product.

For a Rockwell hardness reading of H30, the depth of the impression is only 0.2 mm. (0.008 in.). With the very fine grain sizes of abrasive products usually employed for superfinishing sticks, this depth represents the test of a number of abrasive grain diameters. With Norton grain size No. 500, for instance, this depth corresponds to 10 grain diameters, which is sufficient to give a test on a fairly representative, although minute, portion of the stick.

Coarse Sizes Ruled Out

However, if an attempt is made to extend the Rockwell test to a product of coarser grain size, difficulty is experienced because the depth of the penetration soon corresponds to only one or two grain diameters, and this is hardly sufficient to give a good value. Increasing the diameter of the ball to, say, ½ in. does not improve the situation much, because although by the use of the 150-kg. high limit load of the machine it would be possible to test a larger surface area, nevertheless the depth of such a penetration will be even less than with the ⅛ in. diameter ball.

Mr. Hemingway has directed that in making the Rockwell penetration "the weight lever should be raised *immediately* after it comes to a stop. . . ." The author wishes to emphasize the necessity for raising the weight lever at once, since any vibration that may be present tends to make a continuous increase in the penetration depth and the result may be a considerably lower Rockwell hardness if the full load is left on the specimen for any length of time at all.

Attention should be called to the fact that the zero point on the Rockwell scale is purely arbitrary. There is no particular meaning to the fact that a very soft abrasive product might have a Rockwell hardness of zero, or even of —10, except that a product of zero hardness is 10 points softer than one of hardness +10, and is 10 points harder than one of hardness —10.

Table I presents data showing the relationship between abrasive grain size (grit number) and grain depth of Rockwell tests. This table has been calculated for a few examples between Norton sizes Nos. 500 and 60. For sizes coarser than No. 100, less than one grain depth would be tested, which is not considered adequate for two reasons: First, because surface variables on the articles can easily extend to a depth of one or two gran_diameters, and at such a depth the test will not represent the interior characteristics of the article but merely the effect left by some surfacing operation or other surface condition; and second, because the high degree of variability from one determination to the next when so few grains are tested makes it necessary to take a considerable number of measurements in order to obtain even a fair average.

The values in this table, together with the results of some experiments we have made, indicate that the Rockwell method can be satisfactorily applied to grain sizes No. 320 and finer as recommended by Mr. Hemingway, but extension to much coarser grain sizes would be of questionable value because of the large influence of variable surface characteristics.

Fig. 1 gives a plot of Norton grades vs. Rockwell H hardness for superfinishing sticks in grain sizes Nos. 400 and 500, Regular Alundum, the products being of No. 11 structure. The Norton structure number represents the volume percentage of abrasive in the article, or in other words the relative grain spacing. Higher structure numbers indicate wider grain spacing. No. 11 is the standard spacing used for vitrified superfinishing sticks. Our data on which this table is based gave good correlation between Norton grade of these products and their Rockwell hardness.

Fig. 2 is a repetition of Mr. Hemingway's curve with the Norton grade data superimposed upon it. The latter data are plotted merely for the relationship between Norton grade and

TABLE I

Relationship Between Abrasive Grain Size (Grit Number) and Grain Depth of Rockwell Tests

Grit No.	Average Particle Size (mm.)	Number of Particles Per 0.2 mm. Depth*
500	0.02	10.0
320	0.04	5.0
220	0.06	3.0
100	0.17	1.2
80	0.27	0.7
60	0.41	0.5

*This is the depth for Rockwell H 30

TABLE II

Effect on Rockwell Hardness of Various Treatments Applied to Sticks

Grain and Grade of Stick	Treatment Applied to Stick	ROCKWELL H Before Treatment	ROCKWELL H After Treatment
400 G11	Kerosene	21	31
500 K12	Kerosene	83	85
500 G11	{ Sunoco Spirits, 90 parts; Interna- }	30	39
400 J11	{ tional Compound, No. 155, 10 parts {	70	72
500 F11	Norton No. 3	1	89
400 I11	Norton No. 3	63	97
500 G11	Norton No. 6	34	92
400 J11	Norton No. 6	69	104

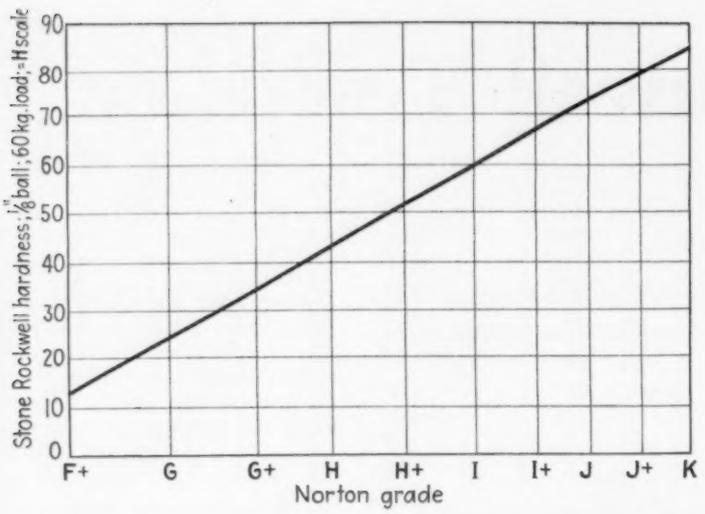

FIG. 1—Good correlation is shown between Norton grade classifications of superfinishing stones and the Rockwell H hardness numbers of each grade. Nos. 400 and 500 Regular Alundum, No. 11 Structure.

Rockwell hardness, and the reasonable assumption is made that the same general relationship exists to the grinding performance of Norton products as was found by Mr. Hemingway for Carborundum and Bay State products.

In presenting the grade data for the products of all three abrasive manufacturers, no definite lines of demarcation have been drawn between grades. This is because such lines imply the existence of grade tolerance limits at these particular points, and we do not feel that we are ready to commit ourselves to these definite limits at the present time. This subject will be discussed again later on.

It is the author's position that this curve can be used to best advantage if it is considered to be a general guide or a point for starting work, rather than a final and inflexible conclusion. It is considered probable that some grinding differences will exist between products of different abrasive manufacturers and that the magnitude of these differences may be somewhat variable, depending upon the nature of the particular finishing operation, the operating conditions, the metal composition being surfaced, etc.

Table II shows the effect on Rockwell hardness of various treatments applied to sticks. When sticks of soft grade are wet with normal grinding lubricants, such as kerosene or Sunoco Spirits plus International Compound, they give a harder Rockwell H reading. The effect is much less for sticks of somewhat harder grade.

When a vitrified stick that has not been treated in any way is put into use, its pores become filled with both grinding swarf and lubricant. The effect of lubricant has just been indicated, and superimposed upon this is an effect due to the presence of swarf. No satisfactory way of removing the swarf from the pores has been found and consequently sticks are expected to grade harder after being used, even when tested after removal of grinding lubricant.

Filling the pores of sticks with a "treatment," such as Norton No. 3 or Norton No. 6 treatment, is seen to increase the Rockwell hardness of the product very much. Such treated products will also have a harder grinding action but this may not be exactly proportional to the increase in Rockwell. It would be surprising if an untreated stick would actually perform exactly the same use as a treated stick of the same hardness number.

It is a difficult problem to make abrasive products that are absolutely uniform throughout, as will be considered in the next section of this discussion. However, similar difficulties with non-uniformities are found in all sorts of materials, and even the standards of hardness supplied with the Rockwell machine are subjected to considerable variation within themselves.

For example, the brass standard supplied with one of the Rockwell machines is supposed to read a hardness between 6.5 and 10 on the Rockwell B scale. An important portion of this tolerance is due to variation in the brass itself as has been shown by some tests made at Norton on this piece for Rockwell H, and also for Rockwell E (the E scale is the result obtained by using 100-kg. load with the ⅛-in. diameter steel ball and reading on the B scale). Quite by accident, a spot was found on this brass that gave two readings for Rockwell H of 94 compared with a value of 90 for readings at other

(CONTINUED ON PAGE 102)

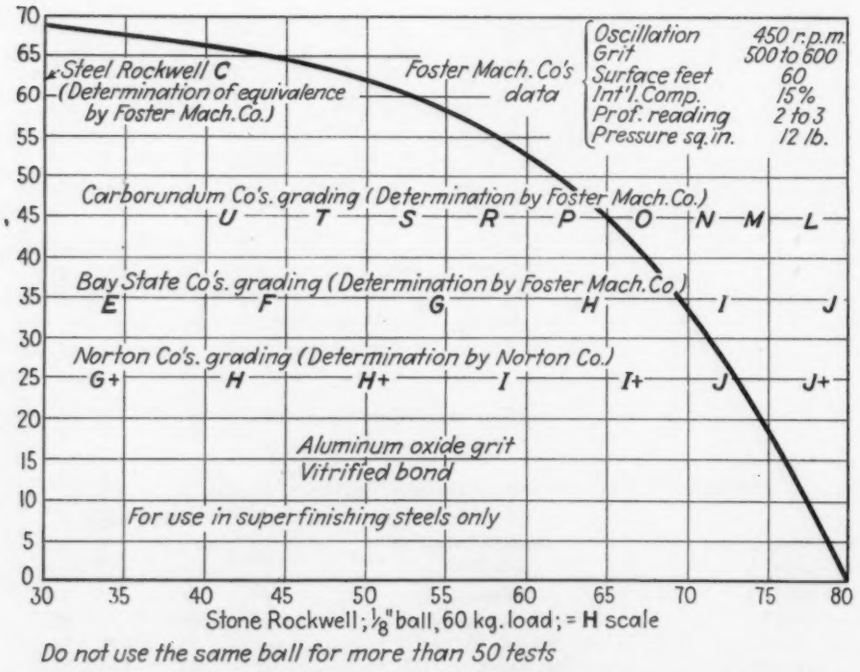
Steel Rockwell C
(Determination of equivalence by Foster Mach. Co.)
Foster Mach. Co's data
Oscillation 450 r.p.m.
Grit 500 to 600
Surface feet 60
Int'l. Comp. 15%
Prof. reading 2 to 3
Pressure sq. in. 12 lb.
Carborundum Co's. grading (Determination by Foster Mach. Co.)
U T S R P O N M L
Bay State Co's. grading (Determination by Foster Mach. Co.)
E F G H I J
Norton Co's. grading (Determination by Norton Co.)
G+ H H+ I I+ J J+
Aluminum oxide grit
Vitrified bond
For use in superfinishing steels only
Stone Rockwell; ⅛" ball, 60 kg. load; = H scale
Do not use the same ball for more than 50 tests

FIG. 2—Relationship for selecting a vitrified bonded aluminous oxide stone for the cylindrical superfinishing of steels of the hardness shown at the left in terms of Rockwell C scale values. Upon the Foster Machine Co.'s data originally published in the April 25 issue of THE IRON AGE has been superimposed Norton grade figures.

Fluorescent Lighting For Accuracy

By W. H. KAHLER
Westinghouse Lighting Division, Cleveland

o o o

IN the new plant of the Cleveland Graphite Bronze Co., where precision bearings are manufactured, many specialized tools and processes are used. But the criterion of precision in the plant depends on skilled workmanship. Machinists and operators must be able to read quickly and accurately fine gages and scales and to detect flaws or defects. Therefore, seeing is all-important.

Natural lighting can furnish proper seeing conditions only a small portion of the time. Artificial illumination, therefore, must be of sufficient quantity and proper quality to provide easy, accurate, quick, and comfortable seeing *all of the time.*

A minimum standard of 20 foot-candles was established for all general work areas. Equally important was the quality of lighting. Illumination must be free from annoying sharp shadows or dark spots. Direct and reflected glare were to be prevented by proper shielding of bright light sources. These requirements were to be met with lighting equipment that presented a favorable economic balance considering initial expenditure, power cost, and maintenance.

The plant consists of three parallel sections; two outer sections with a 14-ft. truss height, and a center section with a 26½-ft. truss height. Three types of lighting treatment were used to obtain equivalent seeing conditions for all areas and at the same time meet physical requirements.

The one low-bay section which extends the entire length of the building (see illustration above) is equipped with fluorescent lighting. Each luminaire includes three daylight Mazda F lamps in individual Alzak-finished alluminum reflectors mounted in a steel housing. A total of 200 luminaires are used in this section.

The light output of a fluorescent lamp follows the cyclic variations of alternating current, which in turn cause light flicker that is only detected by the eye when rapidly moving objects are viewed. However, in a machine shop annoying stroboscopic effect may result. To eliminate any such annoyance completely, each luminaire is supplied from a four-wire three-phase circuit. The three lamps are staggered on the phases by a star connection.

The fluorescent luminaires are supported at two points; a ½-in. conduit on one end and a chain at the other. The conduit terminates at the fixture in a four-wire safe-change detachable hanger and the chain is connected to a hook. Thus, the complete unit can be easily and quickly removed from service for maintenance.

The center section of the plant is too high for economical and practical installation of fluorescent lighting, so a combination of mercury and incandescent lamps was selected to give a quality of light that is a close approach to fluorescent. The equipment consists of 400-watt mercury and 750-watt incandescent aluminum high-bay reflectors in a staggered layout. The candlepower distribution of reflectors is such that the two color qualities are mixed at the working plane.

In the tool room, which is part of a low-bay section, certain corrosive fumes are present that create a necessity for inclosed luminaires. A combination mercury-incandescent unit is available that meets this requisite. It consists essentially of an aluminum reflector, a hinged, diffusing glass bowl, and four medium sockets; one for the 250-watt mercury and three for 100-watt incandescent lamps.

The net result of this "planned lighting" has been improved working conditions through better seeing. The lighting equipment leads to maximum human and manufacturing efficiency, and has been selected to maintain highest foot-candle value of quality illumination per kilowatt-hour dollar. Approximately 23 foot-candles are maintained in low bay areas with fluorescent units and 20 foot-candles in high bay section and machine room.

Finishing Dies and Molds

By H. J. WILLS
Engineer, Carborundum Co.

AFTER a mold or die has been given its rough shape by means of cutting tools, it is brought to correct shape, dimension and finish by means of abrasives.

The degree of finish required depends upon the use to which the die or mold will be put. For a forging die the finish may be a "rough polish." For plastic molds and some drawing dies rather careful smoothing and polishing, and even buffing, may be needed.

All stages of finishing may be done either with a flexible shaft grinder or manually, depending largely upon the accessibility of the surfaces.

Rough Polish: When giving a mold or die a rough polish with a flexible shaft grinder two methods of applying the abrasive are available. The surface may be ground with one of the mounted points shown in Fig. 1. So wide a variety of shapes may be had that one well suited to the contour may readily be found. These are used dry.

Another method is to use an aluminum oxide cloth cartridge, shown next to the right in Fig. 2. These are made by rolling glued aluminum oxide cloth into a firm but flexible tube. Into the ⅛-in. hole a threaded wooden shank is inserted. The shank is driven by the flexible shaft chuck.

When using these pencils, polishing is done dry. They are very effective for polishing both flat surfaces and radii. They are to be had in grit sizes from 60 to 220, and can therefore be used in all stages of die and mold polishing. Very coarse grits should not be used.

Manual rough polishing is best done by means of abrasive sticks lubricated with a compound consisting of 220 grit aluminum oxide abrasive in a grease vehicle. The sticks can be had in round, triangular, square and half round shapes, in both 4-in. and 6-in. lengths.

The combined action of the abrasive stick and the compound gives a lapping action, which while it produces a good finish, does not reduce the cutting speed.

Fine Polish: For fine polishing small areas with a flexible shaft grinder it is permissible to use fine grit aluminum oxide cloth cartridges, or flexible aluminum oxide rubber bonded wheels or mounted points. If the surfaces to be given a fine polish are large, use either aluminum oxide rubber bonded wheels or aluminum oxide cloth bands on rubber mounts.

If done manually, small areas may be effectively fine polished with whitewood sticks using compounds. First apply a 220 grit aluminum oxide, grease compound. Follow this with a 600 grit aluminum oxide grease compound. Finally, use a dry, flexible, rubber bond aluminum oxide stick. If the areas to be fine polished are large, fine aluminum oxide cloth may be used effectively.

Buffing; For buffing with a flexible shaft machine, use a felt wheel or "bob" and a compound consisting of 400 grit aluminum oxide in a paste vehicle. Allow the residue of the paste to dry and then buff it off with loose rag ends wound on a steel shank.

For manual buffing use sticks of hard Mexican felt, grade D or E with 200 grit aluminum oxide grease compound. Follow with a similar compound of 600 grit aluminum oxide and then with 400 grit aluminum oxide paste. Allow the paste residue to dry and buff off with a clean dry rag.

Using Mounted Wheels and Points: In the effort to increase the rate of metal removal when finishing molds and dies, it is common to make the mistake of applying too great pressure. This may be dangerous. Furthermore, with high speed grinders high pressure reduces the rate of cutting and the wheel life.

Modern flexible shaft grinding machines operate up to 100,000 r.p.m. But high peripheral wheel speeds are neither needed nor desirable for mounted points of any bond in mold and die work. Flexible rubber wheels work best at less than 4000 surface ft. per min.

The following table shows the grinder mandrel speeds required to give the safe and efficient operating speed of 6000 surface ft. per min. for mounted wheels and points of various diameter, in vitrified bonds.

Wheel Diameter, In.	r.p.m. to 6000 s.f.p.m. (approx.)
1	23,000
⅞	26,000
¾	30,000
⅝	37,000
½	46,000
⅜	61,000
¼	92,000

With high speed grinders use the standard length mandrels and set the wheel as close as possible to the chuck. Special mandrels more than 2 in. long must be used with great caution.

FIG. 2—Left to right: hard rubber wheel; mounted wheel, any bond; aluminum oxide cloth cartridge; flexible rubber wheel.

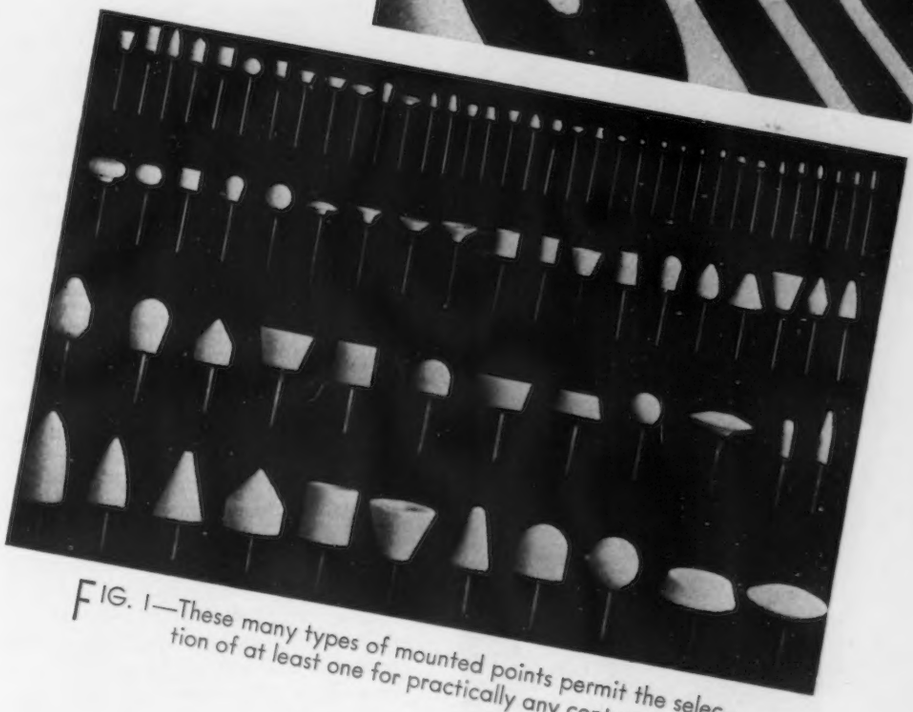

FIG. 1—These many types of mounted points permit the selection of at least one for practically any contour.

Nitriding of Stainless Steel

PARTS made of any recognized stainless steel or stainless iron can now be nitrided by a process developed and jointly sponsored by Drever Co., Philadelphia, and Industrial Steels, Inc., of Cambridge, Mass.

This surface hardening process, known as the Drever-Industrial stainless nitriding process, makes possible the formation of a tightly adhering glass hard (83-93 Rockwell 15N) abrasion resistant case, 0.002 to 0.028 in. thick on the surface of stainless. This nitrided case is said to have superior wear resistant properties and practically the same corrosion resistance as the un-nitrided material. The surface can be ground or polished without loss by abrasion or loss of corrosion resistance.

Parts of 18-8 stainless nitrided by the process have shown "B plus" rating in the standard ASTM salt spray test. Samples of both chromium iron and chromium-nickel iron, after nitriding show "A" rating after test in gasoline, kerosene and fuel oil. It is further stated that high pressure saturated and super-heated steam, impingement test on nitrided 18 8 showed no case deterioration after 100 hr.

Steel Engineers Await

JULIUS A. CLAUSS, president, Association of Iron and Steel Engineers, and chief engineer, Great Lakes Steel Corp., Ecorse, Mich.

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WITH the steel and allied industries operating at the best levels since 1937 and 1939 and with substantially all steel equipment for the making and processing of steel now in operation, it is expected that the annual convention and exposition of the Association of Iron and Steel Engineers to be held at the Stevens Hotel, Chicago, Sept. 24 through 27, will furnish an exceptionally good forum for those subjects uppermost in production officials' minds.

Steel observers point out that the present accelerated activity in the steel business is marked by distinct differences between those which occurred in 1937 and 1939. Those latter periods of peak production were short-lived and in each case were followed by a substantial downward spiral. In contrast to that pattern, many steel men today believe that for the first time since the late '20s, the steel industry might conceivably be entering a sustained high level of operations which might last for two years or more.

It is admitted by steel officials, however, that the premise on which such opinions are based involve the continuation of export demand from the British Isles, a moderate sized program of automotive buying, an increase in the volume of railroad purchases, and the definite support of national defense program once it finally gets under way.

If such factors should materialize and be responsible for a sustained level of steel mill activity, it is obvious that maintenance as well as replacement of obsolete equipment will be even more important than they have been in the past and more especially so with the distinct threat of increased and additional taxes.

It is probably with such thoughts in mind that over 100 manufacturers of steel mill equipment have reserved 85 per cent of the available space in the Iron and Steel exposition to be held in conjunction with the annual convention of the association. The association officials also expect that present conditions in the steel industry will be reflected in the large number of engineering and operating personnel who will participate in the convention. Consequently, the technical program for the convention has been closely supervised by prominent officials of the steel industry with an eye to the future as well as present-day demands.

Timely subjects on modern day trends as well as official installations will be presented and will include data on "High Voltage Air Circuit Breakers," "Modern Electric Furnace Design and Practice," "Mercury Arc Rectifiers for Main Roll Drives," "Welded Construction of Blast Furnace Stoves," "Building-up and Hard Surfacing," "Effect of Soaking Pit Operation on Steel Conditioning," "Hot Scarfing of Billets, Blooms, and Slabs," as well as a myriad of other problems confronted daily by the steel mill executives.

The association, as usual, will conduct two major tours through steel plants during the convention period. Members and guests will have the opportunity to inspect the recently completed cold and hot continuous strip mill at Youngstown Sheet & Tube Co.'s Indiana Harbor works and a trip is also scheduled for inspection of the Wisconsin steel works of International Harvester Co.

W. A. PERRY, 1st vice-president, Association of Iron and Steel Engineers, and superintendent of electrical and power departments, Inland Steel Co., Indiana Harbor, Ind.

Next Week's Exposition

The official program of the convention and exhibition follows:

Tuesday, Sept. 24

Exhibition Hall and Main Ball Room.

9:00 A.M. — Registration — Business Lobby, Main Floor.

9:15 A.M.—Business Session — North Ball Room, Third Floor.

9:30 A.M.—Mechanical Engineering Division—North Ball Room, Third Floor.

"Design and Operation of Gear Drives," by F. P. Dahlstrom, Mechanical Engineer, Farrel-Birmingham Co., Ansonia, Conn.

"Maintenance Shops in the Steel Plant," by T. R. Moxley, General Master Mechanic, Wheeling Steel Corp., Steubenville, Ohio.

"Diesel Shifting Equipment in the Steel Plant," by E. M. Smith, Assistant Sales Manager, Electromotive Corp., LaGrange, Ill.

1:30 P.M.—Electrical Engineering Division — North Ball Room, Third Floor.

"The Application of Demagnetizing and IR Drop Compensation to Cold Strip Mills," by G. E. Stoltz, Manager, Metal Working Engineering, Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

"Modern Electric Furnace Design and Practice," by H. F. Walther, Assistant Melting Superintendent, Steel and Tube Division, Timken Roller Bearing Co., Canton, Ohio.

"Mercury Arc Rectifiers for Main Roll Drives," by L. A. Umansky, Mining and Steel Mill Section, Industrial Department, General Electric Co., Schenectady, N. Y.

1:30 P.M.—Welding Engineering Division — South Ball Room, Third Floor.

"Welded Construction of Blast Furnace Stoves," by H. C. Boardman, Chicago Bridge & Iron Co., Chicago.

"Welded Open Hearth Auxiliaries," by C. C. Keyser, Welding Supervisor, Bethlehem Steel Co., Steelton, Pa.

"Building Up and Hard Surfacing," by L. Ames, Air Reduction Sales Co., New York.

T. E. HUGHES, 2nd vice-president, Association of Iron and Steel Engineers, and superintendent of maintenance, Carnegie-Illinois Steel Corp., Duquesne, Pa.

J. L. MILLER, secretary, Association of Iron and Steel Engineers, and chief combustion engineer, Republic Steel Corp., Cleveland.

F. E. FLYNN, treasurer, Association of Iron and Steel Engineers, and district manager, Republic Steel Corp., Warren, Ohio.

Youngstown Sheet & Tube Co.'s Indiana Harbor hot strip mill which will be visited by Association members and guests.

10:00 P.M.—Exhibitors' Dance—Boulevard Room, Second Floor. Informal.

Wednesday, Sept. 25

9:00 A.M.—Combustion Engineering Division — South Ball Room, Third Floor.

"Effect of Pit Operation on Steel Conditioning," by Charles Labeka, Metallurgical Department, Pittsburgh Steel Co., Monessen, Pa.

"The Comparison of Soaking Pit Designs," by F. E. Leahy, Superintendent of Fuel Department, Youngstown Sheet & Tube Co., Youngstown, Ohio.

"Soaking Pit Control," by M. J. Boho, Sales Engineer, Hagan Corp., Pittsburgh.

9:00 A.M. — Operating Practice Division — North Ball Room, Third Floor.

"Composition Bearings for Roll Necks," by H. R. Gilchrist, Lubrication Engineer, Carnegie-Illinois Steel Corp., Youngstown, Ohio.

"Hot Scarfing of Billets, Blooms and Slabs," by E. A. Doyle, Consulting Engineer, Linde Air Products Co., New York.

"Design and Operation of Continuous Butt Weld Pipe Mills," by J. H. Loux, Electrical Engineer, and E. T. Trebilcock, Assistant Electrical Engineer, Salem Engineering Co., Salem, Ohio.

12:45 P.M.—Inspection Trip: Youngstown Sheet & Tube Co., Indiana Harbor. Buses will leave Michigan Avenue entrance, Stevens Hotel.

Thursday, Sept. 26

9:00 A.M.—Electrical Engineering Division — North Ball Room, Third Floor.

"Reversing Drives for Slabbing Mills," by F. R. Burt, Engineering Department, Metal Working Section, Westinghouse Electric & Mfg. Co., East Pittsburgh.

"Power Requirements for Hot Strip Mills," by W. M. Ballenger, Steel Mill Engineer, General Electric Co., Chicago District, and T. R. Rhea, Steel Mill Engineer, General Electric Co., Schenectady.

"Hot Strip Coilers and Their Drives," by R. A. Geuder, Application Engineer, Reliance Electric & Engineering Co., Cleveland.

9:00 A.M.—Combustion Engineering Division—South Ball Room, Third Floor.

"A Survey of Open Hearth Furnace Design," by W. C. Buell, Jr., Consulting Engineer, Cleveland.

"Relation of Flame Characteristics to Open Hearth Operation," by A. J. Fisher, Fuel Engineer, Bethlehem Steel Co., Sparrows Point, Md.

"Open Hearth Furnace Control," by M. J. Bradley, Engineer, Leeds & Northrup Co., Philadelphia.

1:30 P.M.—Operating Practice Division—North Ball Room, Third Floor.

"Developments in Blast Furnace Cleaning," by C. H. Glaser, Superintendent of Blast Furnaces, Carnegie-Illinois Steel Corp., Youngstown.

"Rehabilitation of Blast Furnaces," by J. H. Slater, Assistant District Manager, Republic Steel Corp., Cleveland.

"Factors Affecting Production of Blast Furnace Gas," by J. S. Fulton, Special Representative, Ingersoll-Rand Co., Pittsburgh.

1:30 P.M.—Lubrication Engineering Division—South Ball Room, Third floor.

"Manufacture and Composition of Grease Lubricants," by Thomas Lennox, Socony-Vacuum Oil Corp., Trenton, Mich.

"Lubrication and Its Relation to Maintenance," by C. W. Phillips, General Master Mechanic, and R. A. Barta, Lubrication Engineer, Republic Steel Corp., Cleveland.

"Application and Care of Bearings in Steel Plant Auxiliaries," by F. L. Gray, Lubrication Engineer, Carnegie - Illinois Steel Corp., Gary Works, Gary. Ind.

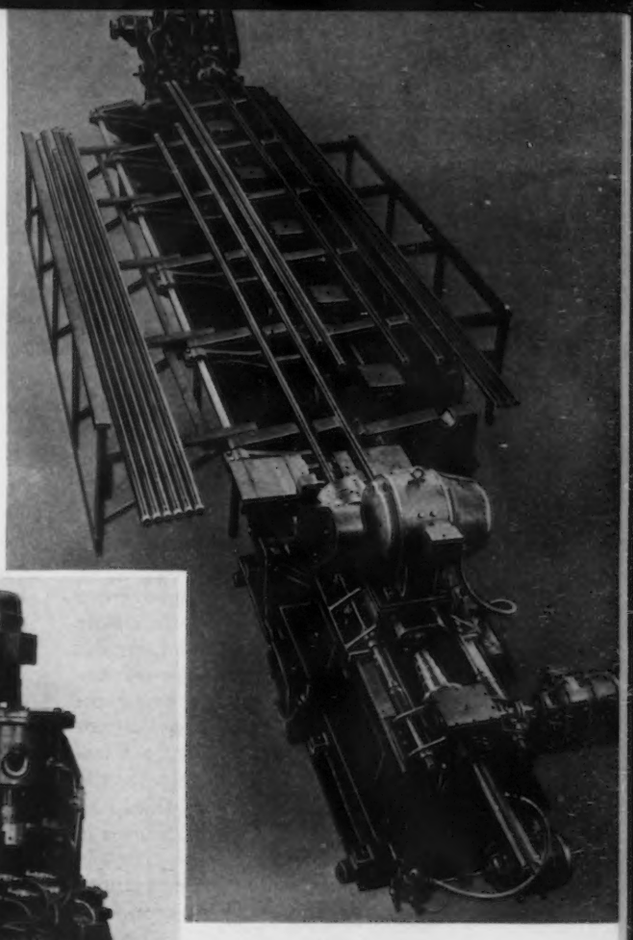
7:30 P.M. — Formal Banquet and Dance—Boulevard Room, Second Floor.

Speakers: E. L. Ryerson, Jr., Chairman of Board, Inland Steel Co., Chicago; and Capt. A. A. Nichoson, Personnel Director, Texas Co., New York.

Friday, Sept. 27

9:00 A.M.—Inspection Trip: Wisconsin Steel Works, International Harvester Co., Chicago. Buses will leave Michigan Avenue entrance, Stevens Hotel.

New Designs in Steel Mill Auxiliary Equipment



THE automatic pipe threading machine pictured consists of two opposed threading machines and electrically operated mill tables that deliver and position pipe alternately at the two threading stations and discharge it to the unloading skids. At each machine, the pipe is first located endwise and then is picked up and carried into a non-rotating chuck, which then closes automatically. Upon completion of the threading operation, the chuck opens and the tables go into operation, taking the pipe to the second threading machine and delivering another pipe to the first. At each cycle, a pipe is discharged from the unit with both ends threaded. The rotating die heads have power rapid traverse in both directions and lead-screw feed during the actual threading operation. Die heads are driven by an adjustable speed motor through V-belts and worm gears. This machine is the product of William K. Stamets, Pittsburgh.

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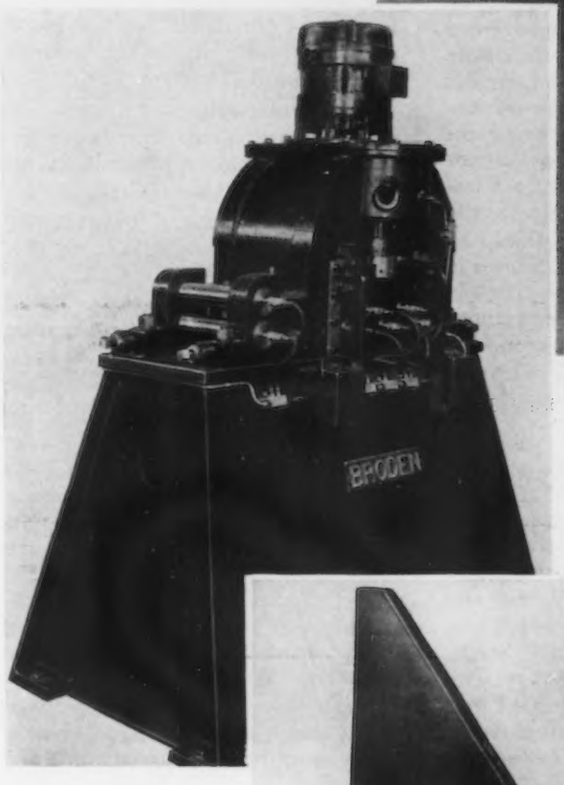
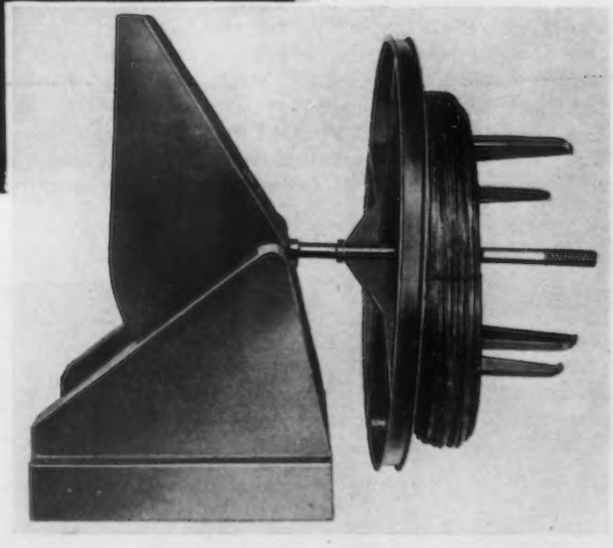


FIVE roll scale breaker for strip steel up to 3/16 in. maximum thickness and 8 in. wide, recently made by the Broden Construction Co., Cleveland. Strip can be pulled through the rolls by a power driven take-up reel at speeds from 200 to 600 ft. per min. Rolls themselves are not driven, the motor shown on top of the unit being used to drive the screw down mechanism for the two top rolls, in place of hand driven screw downs on former machines. Rolls are 2½ in. in diameter and are made of tool steel, hardened and ground. All bearings are lubricated by Trabon centralized lubricating system. Adjusting screws on the guide rolls permit lining up the unit with the reel drum. Leather aprons at entry and exit, as well as a top cover, prevent scale from flying all over. A chute inside the welded steel stand diverts scale into a container at the rear.



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NEW Shiftweight counterbalanced tilting wire reel embodies a shifting counterpoise designed in such a way that regardless of the position of the wire coil, the necessary counterweight is always effectively applied. The ballast acts upon fluid principles, shifting within a housing as the reel is positioned. It is claimed that one man can easily place a 300-lb. wire coil on the reel in the position shown, since there are no foot pedals to throw the loader off balance during the operation. After a reel is loaded, the operator simply releases a locking latch by means of a knurled spindle in the center of the reel and turns the reel unit up to the operating position, with the reel axis vertical. An upper ring keeps the coil in position and an adjustable friction brake prevents overrun. Construction is all welded steel. This wire reel is offered by Moslo Machinery, Inc., Cleveland.

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Machine Tool Improve

DESPITE the heavy demands being placed upon the machine tool industry, its design engineers have not been halted in their efforts to create still more efficient equipment, as this review of recent manufacturers' announcements indicates. A new mass production gear cutter, an armor plate grinder, a heavy duty cold saw and a briquetting press are among the units introduced since the preceding review of this nature was published in the July 18 issue. Improvements in grinders, millers, and broaching equipment, a superfinishing attachment for small work and hydraulic brakes for band saws are also covered.

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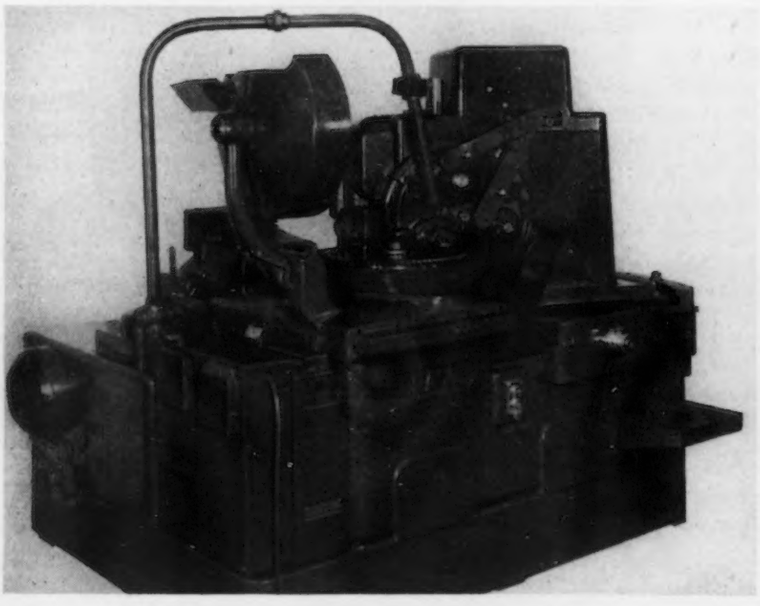
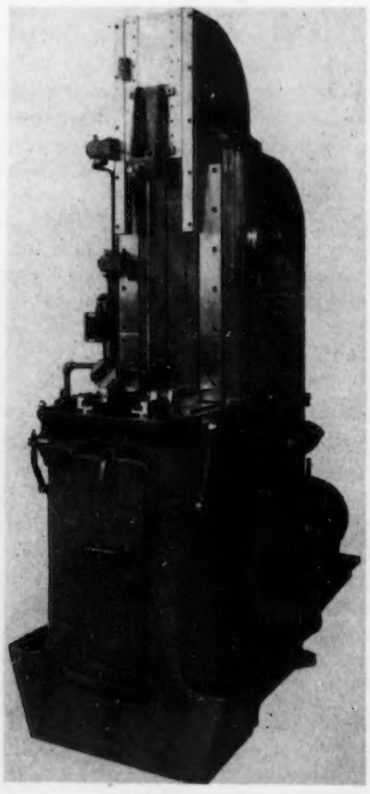
ENTIRELY new in both principle and design is a mass-production machine developed by the *Gleason Works*, Rochester, N. Y., for cutting straight bevel gears, such as is used in automotive differentials, washing machines, textile machinery, etc. Gear teeth can be both roughed and finished in one operation with a single disk cutter. This unit, called the Revacycle, is normally arranged for continuous production of one particular gear or pinion, but can also be set up to handle several jobs consecutively where quantities warrant.

The circular cutter has a number of radially arranged roughing blades followed by a number of similarly arranged finishing blades with a gap between last finishing and first roughing blade. Cutter is mounted on a reciprocating slide and as it rotates in engagement with the gear blank, it also moves along the lengthwise direction of the tooth space. As the cutter moves from the small to the large end of the blank, the roughing blades rough out a tooth space and on the return stroke the finishing blade finishes the tooth space. Blank is held stationary during cutting and at the end of each return stroke, is indexed at the gap in the cutter blades. Each revolution of the cutter completes a tooth space. Conjugate tooth forms are produced as a result of the cutter motions and the profile shapes of the blades. Operation of the Revacycle is entirely automatic, except for chucking. Use of a rotary work holding turret with three spindles makes it possible to unload finished gears and load new blanks at two stations while cutting takes place at the third. Work is held in place by a heavy spring and is released by a hydraulic piston. Clamping and releasing is automatic. Power for clamping, chucking and operating chip remover is supplied by a hydraulic unit. Maximum cone distance which can be handled is 3 in., and maximum face is 1½ in. Coarsest pitch is limited by a maximum whole depth of 0.45 in. Index range is from 8 to 40 teeth and pitch diameters from 2¾ in. to 5½ in.



Three-Way Broaching Unit

IMPROVEMENTS made in the model T-24 broaching machines manufactured by *American Broach & Machine Co.*, Ann Arbor, Mich., include a retrieving mechanism adjustable for broach lengths between 26

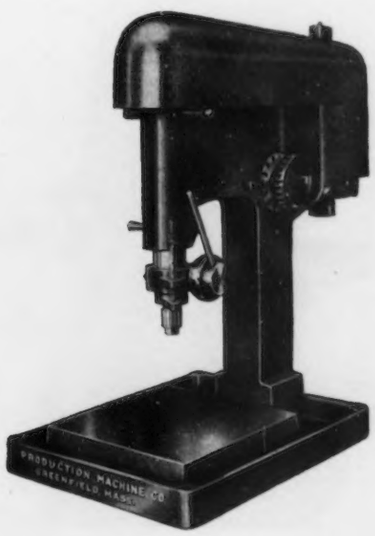


ments Continue . . .

and 31 in., which is hydraulically operated, permitting the operator to have both hands free for manipulation of the machine. Retrieving mechanism is mounted above the column of the machine, has its own slide and hydraulic cylinder, and is hydraulically controlled and timed to enable it to operate in proper relation to the main operating cylinder. Except for loading and starting machine cycle, all operations are automatic. These broaching units are built in 4, 6, and 8-ton sizes with 24 in. stroke and are suitable for push, pull and surface broaching.

Sensitive Bench Drill

THE latest addition to the Reed line of sensitive drills manufactured by *Production Machine Co.*, Greenfield, Mass., is a high speed, all purpose bench drill featuring an infinitely variable drive with a range from 2000 to 10,000 r.p.m. Any speed within this range is instantly available by manipulation of a handwheel. An indicator shows the spindle speed at all times. Drive of this drill is completely enclosed, the chuck and drill being the only exposed parts. Drill capacities range from a No. 70 to ¼ in. and distance from center of spindle to column is 7 in.



Armor Plate Grinder

A TRAVELING wheel type grinder for finishing the edges of armor plate and similar material has been developed by *Hanchett Mfg. Co.*, Big Rapids, Mich. Machine can grind plates up to 20 in. thick, by 10 ft. wide

and 45 ft. long. Grinding wheel is of the segmental type, 48 in. in diameter, is mounted on a carriage which traverses back and forth and can be adjusted from the vertical to a 30 deg. angle. Each abrasive block has 8 x 4 in. grinding face. Wheel spindle is 8 in. in diameter, mounted on tapered bearings. Drive is through V-belts from a 125-hp. motor. A bull gear on the carriage, meshing with a rack on the machine bed, provides the carriage movement. Grinding is done wet, and ways and racks are protected with belt covers.

Knife Grinder

A CABINET base knife grinder, capable of grinding knives with edge up or down, is available from *Samuel C. Rogers & Co.*, 191 Dutton Avenue, Buffalo. Equipped with heavy box type bed and carriage, and heavy ribbed knife bar, it is suitable for a large variety of knife grinding jobs, including woodworking, hog,

barker, paper and light shear blades. Transmission is of the straight and cross belt and shifting lever type. Unit is adjustable for grinding flat or concave bevels and is equipped with full automatic cross feed, 10-in. cup grinding wheel and self-contained wet grinding attachment. Models with knives ranging from 26 to 60 in. in length are available.

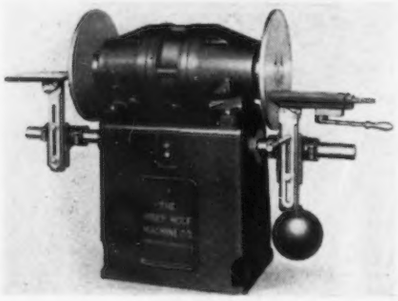
Vertical Spindle Disk Grinder

A RUGGED, built-in oscillating type wheel dresser, making it convenient to maintain a true grinding surface at all times, is a feature of model No. 153 vertical spindle disk

grinder offered by *Hanchett Mfg. Co.*, Big Rapids, Mich. Wheel dresser arm can be swung completely clear of the machine when work is being ground. Unit's abrasive grinding disk is 53 in. in diameter by 1 in. thick and is in eight sections. Wheel spindle is mounted in preloaded precision ball bearings and is driven at 435 r.p.m. by a 25-hp. motor by means of V-belts. Openings are provided beneath the grinding disks for attaching an exhaust system. Grinder can be arranged for wet work.

Direct Drive Disk Grinders

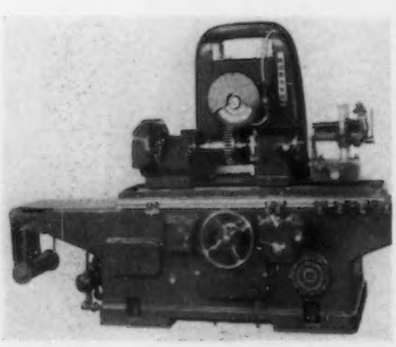
RECENT changes in design of direct drive disk grinders manufactured by *Hisey-Wolf Machine Co.*, Cincinnati, includes use of extra heavy end bells with feet to carry the bear-



ings directly behind the disks. Bearing construction has also been improved, as has the method of lubrication. Air circulates through the motor, through feet of end bells into pedestal and back through motor. This arrangement is said to give all advantages of a totally enclosed motor with the added feature of cooler operation. Machine is made in sizes from 3 to 10 hp.

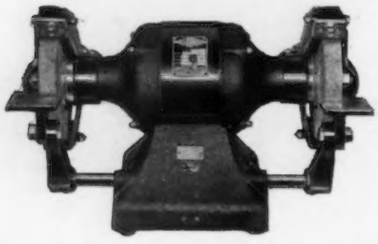
Gear Grinding Unit

DEVELOPED originally to meet needs of precision grinding of master gears and involute broaches in its own plants, *National Broach & Machine Co.*, Detroit, is offering for general use a new Red Ring gear grinding machine. Rigidity is obtained by use of a U-column. Wheel spindle, integral with motor rotor, is mounted on long bearings. Spindle slide is adjustable up and down by a handwheel and hydraulic counterbalance removes all backlash from lead screw. Down feed operates against hydraulic pressure, eliminating possibility of head sticking when small increments of down feed are desired. Table slide is hydraulically reciprocated and automatically controlled through a feed box mounted on front of machine. Ways are force feed lubricated at each stroke. Index head is available with either fully automatic or semi-automatic control. Radius trimmer is mounted in the tail stock and a template trimmer for gear tooth work is provided which trims both sides of the wheel simultaneously.



Electric Bench Grinder

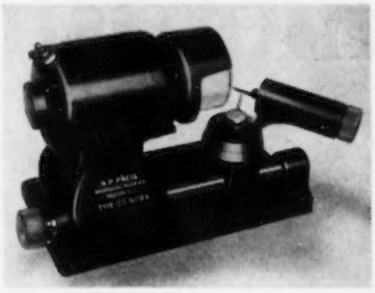
SUBSTANTIALLY built for general service in grinding, buffing and wire wheel work, the new Thor electric bench grinders offered by *Independent Pneumatic Tool Co.*, 600 W. Jackson Boulevard, Chicago, are available in three sizes—6 in. light duty, 6 in. heavy duty and 7 in. heavy



duty. All sizes are provided with adjustable tool rests, and can be equipped with safety glass eye shields. Wheel guards on the 7 in. model are of the enclosed type with chutes.

Routing Cutter Grinder

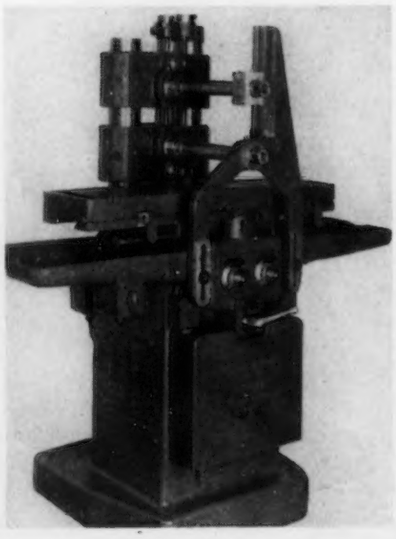
A COMPACT bench-type grinder for accurate sharpening of routing and single lip engraving cutters has been announced by *H. P. Preis Engraving Machine Co.*, 157 Summit Avenue, Newark, N. J. The unit, designated as the Panto model CG, handles tapered and straight shank cutters up to ¼ in. diameter. Grinding wheel is cup shaped and attached directly to shaft of a totally enclosed ball-bearing universal motor. Cutter holding spindle is mounted in a swivel arm graduated for quick setting to any cutting angle or taper. Stop notches are provided for grinding three- and four-cornered cutters. In operation, cutter is rotated with one hand and carriage



is fed to the grinding wheel by means of a feed-screw actuated with the other hand.

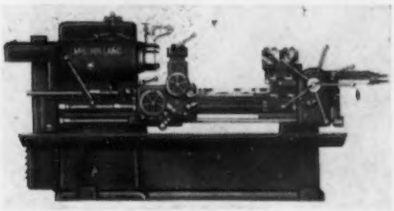
Double Spindle Millers

KENT-OWENS MACHINE CO., Toledo, has introduced a new line of milling machines equipped with double spindles which is especially suited for splitting bushings, milling slots in pistons and for a wide variety of parts where there are two or more surfaces spaced from each other which can be milled to advantage by using two cutters mounted on different spindles. Machine illustrated has 14 in. table travel and a 32 x 9 in. table. Two panel dials, one for fine feeds and one for coarse feeds, regulate the feed rate of the table from ½ to 80 in. per min. Each spindle has independent horizontal and vertical adjustment. Center distance between the spindles is 4¾ in. minimum, and 11 in. maximum. Center of lower spindle can be brought to within 1 in. of table surface while center of upper spindle can be raised a maximum of 12 in. from table surface.



Universal Turret Lathe

THE improved No. 4 Universal turret lathe manufactured by *W. K. Millholland Machinery Co.*, 1115 E. 35th Street, Indianapolis, has the bed rigidly mounted on a new type sub-base and swings 20 in. over the



ways. It is available in bar capacities of 1¾, 2 and 2½ in. The sub-base is of one piece box construction and extends under the full length of the bed, with the finished pads of the bed at the headstock and turret ends bolted to the finished surfaces of the sub-base. Screws are provided in sub-base for leveling the machine. Chip pan is mounted on a ledge between bed and sub-base to maintain proper alinement of the machine.

Hand Milling Machine

NEW addition to the line of milling machines manufactured by *Machinery Mfg. Co.*, 3636 Irving Street, Vernon, Los Angeles, is the No. 0 hand miller for high speed milling of smaller parts. Unit is available with two standard speed ranges—100 to 1000 r.p.m. and 150 to 1500 r.p.m. Rack and pinion feed is obtained by a hand-operated lever. Power is obtained from a fully enclosed variable drive unit Spindle taper is No 9 B. & S. Overall height is 58 in.

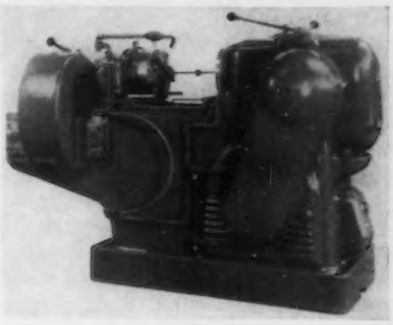
18 in. Throat Band Saw

BUILT for toolroom and general machine shop work, the new model NS-18 band saw introduced by *Grob Brothers,* Grafton Wis., has an 18 in. throat and will handle blades from 1/16 x 0.025 in. up to 1 in. wide. Frame is of one piece welded steel construction with swinging doors giving quick access to saw blades. Cast iron table is 24 x 24 in., heavily ribbed, and is tiltable four ways. In addition to being clamped in the conventional

manner, it is locked with a table stabilizer for greater rigidity. Butt welder and flash grinder is mounted on frame. Both upper and lower saw guides are adjustable in height. Ten blade speeds are provided, ranging from 50 to 2000 ft. per min.

Special Threading Machine

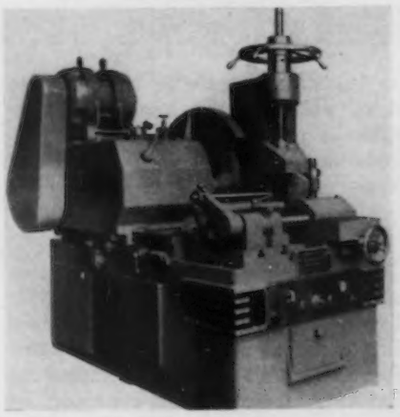
DEVELOPED for handling special threading operations in which extremely close tolerances for concentricity must be maintained between the thread and the body of the work, the Landmaco leadscrew type unit illustrated, made by *Landis Machine Co., Inc.*, Waynesboro, Pa., incorporates such features as a special carriage front on which die head is mounted, an adjustable tail stock which also supports a center, and a face plate on the machine spindle supplanting the usual die head. Since work requiring close tolerances for concentricity is usually ground by supporting on centers, provision is made in this Landmaco unit for supporting work in a similar manner. The face-



plate, which also contains a live center, is employed in exactly the same manner as a faceplate on a grinding machine or lathe to drive the work with a dog. Carriage supports the die head which is, in this case, used as a stationary type head. The tailstock is clamped into position on ways located on side of machine bed. These ways are sufficiently long to permit handling work from 2 to 16 in. long. Tailstock center is advanced or withdrawn from work by a quick acting lever located atop the tailstock.

Heavy Duty Cold Saw

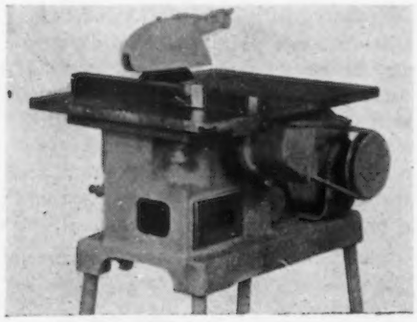
FEATURING nine saw blade speeds ranging from 18 to 134 ft. per min., the new No. 3 cold saw announced by *Motch & Merryweather Machinery Co.*, West Third and Lakeside Avenue, Cleveland, was designed for heavy duty work. Saw carriage and V-belt drive are a self-contained unit. Rotation of saw is controlled by a multiple disk clutch and brake running in oil. Speed change gears are the spur type, sliding on hardened and ground spline shafts, mounted on



Timken bearings. Gear in final drive train is helical with exceptionally wide face to assure freedom from chatter. Hydraulic unit and control valves are located in a separate compartment in the base, securely guarded against contamination and leakage. Saw carriage feed is hydraulically operated for stepless variable feed as well as quick return. Incorporated in the hydraulic unit, which is a low pressure type, are two adjustable valves which can be set to limit total feed pressure on saw carriage and to insure clamping work prior to the feed of the carriage. An advantage of this arrangement is that if the blade encounters a change of section or hardness which overloads it, the feed rate is automatically decreased until overload is eliminated, then normal feed rate is resumed. Gage to measure feed and clamping pressure and an ammeter to measure power input to saw blade are mounted on panel in front of unit.

Abrasive Cut Off Saw

THE *Crescent Machine Co.*, 11 Cherry Fork Avenue, Leetonia, Ohio, has announced a portable, motor driven machine for cutting enameled sheet metal tile up to 3/32 in. thickness, as well as metal tubing, tile and wood. A Westinghouse ⅓-hp. motor is used for drive through V-belt. Arbor is mounted on SKF ball bearings. The abrasive wheel is 8 in. in diameter, with a projection of 1¾ in. above the table for cutting tubing up to 1½ in. o.d. An 8-in. steel saw can be substituted for cutting boards up



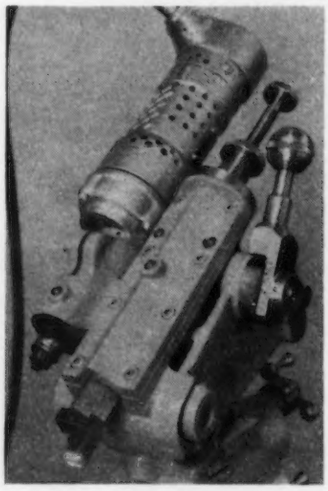
to 1½ x 12 in. wide or ripping up to 6 in. wide. For cross cut work, the table is movable and slides on steel rods through the medium of babbitted brass tubes.

Tapping Machine

IN multiple station dial feed tapping machines for repetitive work, made by the *L. J. Kaufman Mfg. Co.*, Manitowoc, Wis., all operations are performed with air pressure, including the indexing, locking and clamping of parts. Work dials to accommodate eight, 12 and 16 stations can be furnished, and the chucking jaws or complete dial can be changed to accommodate different work of a similar nature. A two spindle tapping head is used, and two pieces of work are produced at each stroke of the spindle. Ejection of finished work is automatic. All operations are interlocked. The illustration shows a No. 5-A Kaufman Hi-Duty tapping machine with a No. 40 index and eight station chucking dial.

Superfinish Attachment

DESIGNED for mounting on lathe compound or cross slide to superfinish fractional inch diameters, *Foster Machine Co.*, Elkhart, Ind., is offering a Model O light duty superfinish attachment. Stone is oscillated



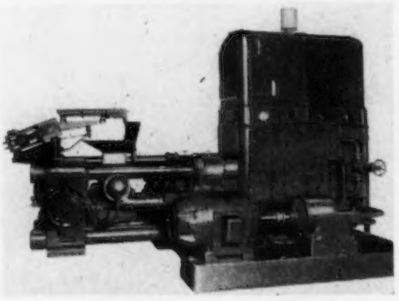
in a straight line movement by a small gear motor and can be retracted by a lever without disturbing the setting. Stone pressure in this unit is provided by a sensitive, easily adjusted spring.

Band Saw Brakes

TO eliminate possibility of inflicting injury to the operator and damage to the machine, *Tannewitz Works*, Grand Rapids, Mich., is equipping its high speed band saws with hydraulic two wheel brakes which operate automatically in case of saw breakage. When breakage occurs, a tension lever is released which immediately shuts off current and applies brakes, quickly bring both wheels to a dead stop. This device may be used in normal operation to stop wheels by use of push button control.

Briquetting Press

A PRACTICAL and economical method of salvaging metal swarf on a smaller scale than has been heretofore possible is provided by a new line of briquetting presses announced by *Milwaukee Foundry Equipment Co.*, Milwaukee. Unit will handle any type of metal borings and turnings and is available in capacities of ¾, 1 and



2 tons per hr. Presses are fully automatic and operate hydraulically from a single constant delivery oil pump developing a pressure of 1500 lb. Briquettes made from steel turnings have a density of about 70 per cent and from cast iron, 80 per cent. Density of non-ferrous metals will run higher than this. Cutting oils can be almost completely salvaged by use of suitable drains and deflectors. A magnetic type feeder flows material at a uniform rate into receiving hopper where the chips are briquetted by a ram developing a final pressure of 120 tons. Full pressure control of the ram is provided. The receiving hopper, independently actuated, strips the die from the briquette and drops the briquette into a chute from which it is carried away by suitable conveying equipment.

Woodworking Equipment

A VERSATILE portable woodworking machine for pattern shops is offered by *De Walt Products Corp.*, Lancaster, Pa. This machine, which occupies floor space of 4x4 ft., is capable of 29 different operations, such as sizing and joining, routing core boxes, cutting angles in the forms for making heavy bed patterns, and also bevel rips, rounds corners on ribs, and easily runs drafts on patterns.

Lubricating System

A JUNIOR model centralized lubricating system designed especially for small machine tools and other equipment is being marketed by *Farval Corp.*, Cleveland. This new unit operates on the same piston displacement principle of measurement employed in the company's large system for heavy machines, has only two moving parts and is fully adjustable.

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In addition a corps of technical men are available to (1) help industrial executives make use of data developed by the Revere research laboratory staff; (2) perceive the material problems existent in industrial plants contacted; (3) assemble data enabling Revere research laboratory men to study these problems; and (4) make practical tests of the materials recommended in the plants concerned.

This Revere Technical Advisory Service set-up has been very successful in reducing costs, improving products and increasing the output for many industrial concerns.

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On The Assembly Line

BY W. F. SHERMAN
Detroit Editor

• Chrysler Corp. breaks ground for $20,000,000 plant for military tanks for the Army . . . Government will own plant as a "going" concern . . . More new 1941 models are shown . . . Automobile production goes up

DETROIT—Trucks, steam shovels, diesel tractors—a mechanized gang—felled trees and started excavations Wednesday of last week for the first of a new kind of American armament plant. Huge scoops were used—not the usual ceremonial spade — as ground was broken officially for a $20,000,000 Army tank plant, to be owned by the government, operated by Chrysler Corp., and hereafter maintained as an integral part of a federal munitions industry.

Significance of the event is transcending. It means that, after current defense demands subside, this plant and others like it will continue to stand, kept in an operative condition always as a bulwark in our national defense. The country will have a continuing defense industry. It will not be scrapped, as was the entire munitions industry after the last war. The interpretation placed on the move here, since Chrysler and the government signed an entirely new type of contract, is that there is an important change in the fundamental concept of how this nation will guard itself in the future.

The change stems from experiences after the last war—and from recent appreciation of the time necessary to tool up for rearmament when we find it necessary. Good examples of previous practice abound, but the old Dodge truck plant here in Detroit is typical. After the war, this plant, stripped of its ordnance manufacturing equipment, turned to truck manufacturing. Machines and tools, crated then and shipped to the Rock Island Arsenal, are there yet, unused for 20 years and still crated.

World War Plants Scrapped

MANY other war-producing plants were similarly stripped and scrapped after the last war. On one hand, industry could not stand the burden of carrying idle plants of this type on its books; on the other hand, the "merchant of death" label was being applied so freely that few industries wanted war babies on their hands. Thus the war-time defense industries disappeared, and arsenals alone carried on the small production that was required in peacetime.

The contract between the government and Chrysler for tank production is the first of its kind, according to K. T. Keller, Chrysler president. The government will pay for the building and take title to it as soon as it is erected, also paying Chrysler $2 in fees for putting up the building. (For the Quartermaster's Corps, $1; for the Ordnance Department, $1.) Thereafter, the Army will lease the building to Chrysler for $1 a year for the manufacture of tanks on a flat price basis. No right to operate the plant is vested in Chrysler, the lease could be granted to someone else, or the plant might stand idle, under care of guards and watchmen when its output is not needed.

Thus with the plant still standing, and kept in operating condition, the government can call in Chrysler, or some other manufacturer, in five or 10 years, and carry on an educational program, on a much better scale than recent activity with "educational orders." Or, when necessity decrees, tool and die men can be sent in, the plant tooling changed or modernized, some production run to test the setup, and the plant again "frozen" until needed. The country will have a munitions industry "ready to turn on, like water or electricity in your house," as Mr. Keller expressed it in an interview last week after the preview of 1941 Chrysler-built cars.

Regarding the tanks, it was revealed that Chrysler's order is for 1000 tanks of the 25-ton size, costing $33,500 each. The next thousand will cost $28,500 each. Power will be supplied by 450-hp. Wright radial airplane engines.

No military secret is the story of how the tank project was negotiated. Knudsen, neighbor of Keller, but a competitor for all the years which Knudsen has spent with Ford and General Motors, phoned Keller one Saturday afternoon last spring that he would be home from Washington during the weekend, and that he wanted to talk to Keller on Sunday morning. To the point, Knudsen asked Keller merely if he would build Army tanks. It was agreed, then and there, that Chrysler men and facilities would be made available by Keller, so he went to Washington on Tuesday to confer, and returned with 186 lb. of blueprints, ready to have his engineers and production men begin a thorough study of the project.

Model Tank Made of Wood

THERE followed four and one-half weeks of intensive study and work by 197 men, working from 8.30 a.m. each day until 11 p.m., except on Saturdays and Sundays, when they ended the day at 5 p.m. The study, incidentally, cost $100,000.

To insure the productability of the product, each part of the tank was made out of wood in Chrysler pattern shops, painted and assembled with others to form a "dummy" tank. Paint was put on all parts, as it would be in production, to determine whether all pieces would go together, accurately, without scraping paint off or changing necessary dimensions. Accurate

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A. ***Advisory Service.*** When you send us your tap order for a job that's *new* to you—involving unfamiliar alloys, unusual cutting conditions, or whatever—give us full details of the operation planned. P&W tool engineers can save your time and money by helping you select the precise combination of size, shape, rake angle, heat treatment and all the other variables of the simplest tap which affect tapping efficiency.

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PRATT & WHITNEY TAPS

assembly was attained, and Keller is authority for the statement that all parts went into the complicated assembly without "scratching a bit of paint." He describes the tank as having all the characteristics of a "locomotive, and a Swiss watch."

Five Tanks in Eight Hours

Incidentally, the Chrysler head, who is extremely proud of the craftsmanship and skill of his own mechanical forces, paid high tribute to the Army and its mechanical forces. "They have fine shops at the Arsenal (Rock Island)," he asserted "and proud as I am of our own men, we'd be awfully glad to have the arsenal gang working shoulder to shoulder with us."

Of the idea that certain idle auto plants around Detroit could be used for similar work, he said that buildings are of least importance in the list of requirements. He rated a supply of trained men, quickly available (even in later years for "educational orders" of the kind mentioned above) as most important. The new plant, which will employ 6,000 men on one shift, will turn out five tanks in eight hours. The amount of labor required is indicated by the fact that the transmission alone takes 1000 hours of productive labor in its manufacture.

In a talk to the preview audience, Mr. Keller emphasized a thought expressed in last week's "Assembly Line" regarding the place of auto production in the present scheme of things. He said: In the last 20 years a great change has taken place in transportation in this country which is directly related to national defense . . . . The military usefulness of the automobile was beginning to be recognized in the last World War . . . . But today people are beginning to realize that an adequate national defense calls for both the civilian and the military usefulness of the motor car . . . . I believe the industry is resourceful enough to take in its stride both the job of national defense . . . . and the job of maintaining production for civilian use."

More New Cars Shown

With the display of the Dodge, De Soto and Chrysler passenger cars last week, the entire Chrysler line of passenger cars has been shown to the press. The preview of Plymouth 1941 models was held in mid-August. The most important changes in several years are apparent in the cars just shown. Entirely new bodies make the cars look sleeker, not so fat, as in the current trend. Substantial improvements in the transmissions, coupled with the fluid drive, heretofore available only on the higher priced Chrysler line, offer both a new thrill and new ease of driving.

Ford-Mercury-Lincoln and Chevrolet last week revealed new 1941 models for the first time. Since these cars will not be shown to the public and, in some cases to sales organizations, for a week or so, detailed descriptions have not been released. However, the Ford-Mercury-Lincoln group is substantially broader than before and includes a group of luxurious new cars which will be called the Lincoln Custom — including an eight-passenger sedan, an eight-passenger limousine and the Lincoln Continental.

Most unusual of all previews is the one that was staged by Ford Motor Co. A fleet of 10 cruisers took more than 250 news men from all over the nation on a cruise down the Detroit River and up the Rouge River to the Rouge plant. There the visitors transferred to a train which consisted of an electric locomotive and a string of flatcars on which observation benches had been built. The route of the cruisers traced a path into the Rouge plant followed by most of the raw materials of which automobiles are made. The tour along part of the 100-mile network of rail lines inside the Rouge plant followed the course of raw materials as they are processed into motor car parts and finally assembled into complete cars.

No six-cylinder car was shown at the preview. However, Ford men are becoming a little less reticent about the subject and indicate that, if conditions are propitious, the six will make its appearance about the first of the year. Actually, there are definite signs pointing in this direction. Lincoln, Lincoln-Zephyr and Mercury sales and service will be handled separately from Ford sales, beginning Oct. 1, the move being made in anticipation of the introduction of the six, dealers and distributers have been told.

Automobile production nearly doubled during the last week, reaching a total of 63,240 units compared with 39,665 in the previous week and 42,445 in the corresponding week of last year, according to Ward's Automotive Reports.

HIDING BEHIND SKIRTS—Only three official photographs have been issued on the 1941 Fords, and newsmen were warned not to use any others. Each of the three is half concealed, half revealed, as is this photo of a '41 Super Deluxe V-8.

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BY L. W. MOFFETT
Washington Editor

• Housing program providing $150,000,000 to end any shortage "Impeding national defense" is approved . . . Private capital expected to provide two-thirds of defense housing requirements

WASHINGTON — A $150,000,000 emergency housing program under which Federal Works Administrator John Carmody could provide housing units in any area where the President found "an acute housing shortage" likely to impede national defense was approved by the House last week in a unanimous voice vote. Passage of the legislation had been recommended by the War and Navy Departments and by the National Defense Advisory Commission.

The projected program approved by the House is over and above the $100,000,000 item for Army and Navy housing contained in the War and Navy Department second deficiency bill signed early last week by the President. Of the $100,000,000 provided in that measure, approximately $93,000,000 already has been tentatively allocated for the use of the Army and Navy in 110 locations spread over 30 states, Hawaii, Panama Canal Zone, Puerto Rico, and Guantanamo in Cuba. The allocations were designed to provide about 10,000 units at naval stations or Army posts. About 16,000 additional units off the reservations, to care for the families of defense workers whose housing requirements would not otherwise be met, also are provided for under the deficiency appropriation.

The War Department late last week allocated $33,685,802 for additional temporary housing construction facilities at various Army posts. Including this latest allocation, the total value of housing projects under the Army's expansion program now amounts to $70,314,657.

Average Cost of Houses Limited to $3,000

IN the defense housing bill just passed by the House Congress seeks to meet the needs of civilian workers to be employed in plants that have been established, plants that are in operation and plants that subsequently will be established as a necessary arm of the defense program. Average costs of houses constructed under the bill would be limited to $3,000 per family dwelling unit in the continental United States and $4,000 in American possessions and territories. The measure provides that it is the intent of Congress to recoup as much money as possible for the government by disposing of the property after the emergency has passed.

Participation in the program by the United States Housing Authority, a controversial question which threatened for a time to delay the consideration of the bill, was rendered unlikely by the proviso that the Federal Works Administrator, acting through the Public Buildings Administration, is to be primarily in charge of the work. During the House debate the Public Buildings Administration, which formerly was under the jurisdiction of the Treasury Department, was praised for its handling of government construction activities in the past, while the USHA was condemned by several members as being in competition with private industry.

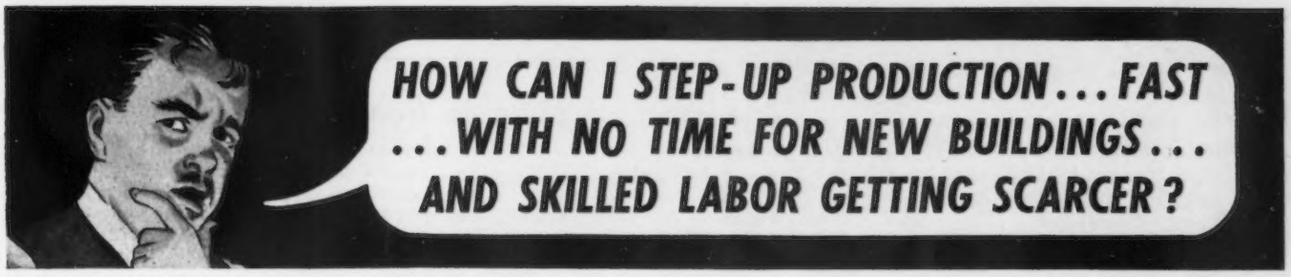
The administrator, however, is authorized to utilize the plans, specifications, personnel and facilities of all the government's housing organizations and can bring into the picture local housing authorities which were created under the USHA's program by statutes in the various states.

House leaders estimated that the $150,000,000 provided for in the measure and the $100,000,000 already appropriated under the army and navy deficiency bill will by no means be adequate to take care of all the emergency housing facilities which ultimately will be necessary under the defense program. Members expressed the hope that private capital will take care of practically two-thirds or more of the defense housing requirements. Despite the work of the housing coordinator of the defense commission, aimed at cooperating with all private and quasi-public agencies, it is conceded that in many instances it will be impossible to get private capital interested in defense housing.

The bill diverts $10,000,000 of its funds to the Reconstruction Finance Mortgage Co., and there is an additional $40,000,000 available for housing projects under the RFC. But despite these efforts to sell private industry on the projects, it is doubtful whether it can be sold to any great extent on an emergency construction program.

Hundreds of Expert Shipbuilders Available

ON the other hand, members of Congress made no attempt to cover up the fact they are extremely interested in securing housing projects in their home states. Congressman Bernard J. Gehrmann, Farmer-Laborite of Wisconsin, for example, complained that, although Superior, Wis., has one of the largest shipyards on the Great Lakes and operated 24 hours a day during the World War, there are no ships being built there now. The yards, said Mr. Gehrmann, are equipped to build mine sweepers, mine layers, and all types of auxiliary ships, hundreds of expert shipbuilders are available in the section, and "we have thousands of empty houses."



GENERAL ELECTRIC OFFERS AN EFFECTIVE SOLUTION TO TODAY'S EMERGENCY PRODUCTION PROBLEMS!

THE present national emergency demands that industry produce more goods . . . of better quality . . . and at greater speed than ever before.

If there's no time for new buildings, and skilled labor is difficult to get, the alternative is to get more and better production from existing equipment.

Adequate plant lighting . . . better light for faster, safer, more accurate seeing . . . offers every industrial plant in the country an effective means to meet today's emergency production demands.

Industrial lighting surveys show that most plants can go a long way toward better production schedules by bringing their lighting up to modern standards of efficiency. For higher levels of properly planned lighting have a direct bearing on increased production.

Important to the efficiency of any lighting modernization job is the use of good lamps. Because General Electric makes all types of lamps, you can be sure of an unbiased lighting recommendation. Your G-E lamp man or your electric service company will show you how to get the higher lighting levels needed for better production. If you would like to see how other plants have increased production with better lighting, write to General Electric Company, Dept. 166-IA-I, Nela Park, Cleveland, Ohio. Ask for a copy of the booklet, "Better Light for Better Production."

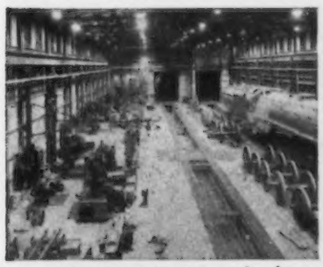
Better Lighting speeds production in these plants!

A CHICAGO RADIO COMPANY found production up, rejects down, after light-conditioning with regular G-E MAZDA C (filament) lamps. Employees have 55 footcandles of light on assembly work.

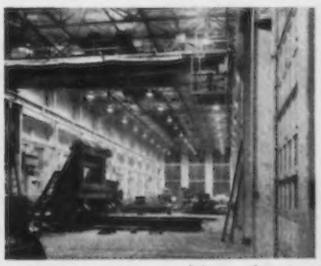
THIS CLEVELAND manufacturing plant appreciated that good light is indispensable in the manufacture of a quality product and used 300-watt G-E MAZDA C lamps in RLM dome reflectors to get it.

INSPECTION IS MADE easier and eyestrain lessened by an installation of G-E MAZDA F (fluorescent) lamps over inspection tables in this tinplate plant. Better lighting speeded production, reduced spoilage.

BENCH WORK and fine assembly generally need well diffused supplementary light to soften shadows and reduce glare. G-E MAZDA F lamps may provide 100 footcandles or more without discomfort from heat.



IN THIS LOCOMOTIVE repair shop, 400 watt G-E MAZDA H (mercury) lamps provide excellent high bay lighting. Good lighting like this aids accuracy by relieving nervous tension. It also helps reduce accidents.



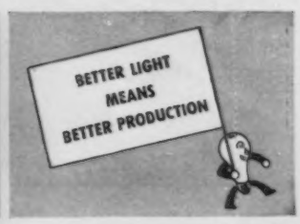
IN THIS METAL working plant a mercury lamp installation provides 30 footcandles on the working plane although the lamps are mounted at a 35-foot height. Seeing is easier and more productive.

IN THE AUTOMOTIVE industry G-E RF (Cooper Hewitt) Fluorescent lamps find many applications such as lighting this paint spray booth. Heat bothers less because more electric energy is converted into light.

RF FLUORESCENT lamps provide excellent illumination in this southern hosiery mill. Under this well-diffused light, threads are so clearly defined as to appear magnified. Inspection is simpler, production up.

G-E MAZDA LAMPS

GENERAL ELECTRIC



Bethlehem Resists Biddle Plea

Washington

Determination of prices in government contracts in the event the court granted the government's request would be transferred from the Executive to the Justice Department and questions of policy in respect of such contracts would be transferred from Congress to the courts, Attorney Frederick H. Wood said in a petition filed with the Supreme Court last Thursday in which he asked rejection of the department's request for a review of two World War cases begun in 1925 and 1926 against the Bethlehem Shipbuilding Co. (THE IRON AGE, Aug. 29, page 60).

Solicitor General Biddle recently filed proceedings with the Supreme Court in an appeal against lower court decisions upholding 1918 contracts Bethlehem made with the Government. Attorney General Jackson made the filing of the Bethlehem petition an occasion to say that charges that the Government was reopening the Bethlehem case a "falsehood." Such charges were made by David Lawrence in an article in daily papers. Mr. Jackson declared that the Government was trying to recover profits of $5,270,000 from Bethlehem.

Price Policy on War Work?

Solicitor Biddle has asked the Supreme Court to review the case on the basis that the present defense program made it necessary to see how far the nation should be "placed at the mercy" of contractors. Since the lower courts had upheld the contracts, allegations have been made that the Government now is trying to get the Supreme Court to repudiate the contract and in effect declare a price policy on war work.

The Bethlehem petition declared that the Government is attempting "to escape payment in accordance with the terms of the contracts." It was stated that the government's case rested solely on the assumpiton that the contracts included inflated cost estimates. That contention, the petition said, presents a question of fact which the lower courts have decided against the Government. Mr. Wood asserted that "no authority is cited in support of that startling contention."

No Authority in Law

"There is no authority in law or elsewhere which would warrant the adoption of the suggestion made in the petition that conditions of our present national emergency are such as to require this court to define the limitations surrounding the profits which a government contractor may lawfully receive or retain in time of war," the petition pointed out.

"Carried to its logical conclusion," he said, "the contention of the Government would appear to be that this court, independent of any statutory limitation of profits, should declare that, as a matter of law, no government contractor, in time of war or at any other time, no matter what the terms of his contract may be or what benefits may be derived therefrom by the Government, may receive or retain any profits in excess of that which

Members of Defense Board to Go On Air

Washington

• ○ • Edward R. Stettinius, Jr., will be the first of the seven members of the National Defense Advisory Commission who will report progress of the defense program in a series of weekly nation-wide radio broadcasts beginning Sept. 19. This series is presented through the cooperation of the three major networks. A list of the dates, commissioners and networks follows:

Date	Commissioner	Network	Time (EST)
Sept. 19	Edward R. Stettinius, Jr.	CBS	9:15-9:30
Sept. 26	Miss Harriet Elliott	Mutual	6:15-6:30
Oct. 3	William S. Knudsen	NBC	9:00-9:15
Oct. 9	Chester C. Davis	CBS	10:15-10:30
Oct. 17	Ralph Budd	Mutual	7:15-7:30
Oct. 24	Sidney Hillman	NBC	9:00-9:15
Oct. 30	Leon Henderson	CBS	10:15-10:30
Nov. 7	Donald M. Nelson	Mutual	7:15-7:30

THE BULL OF THE WOODS — BY J. R. WILLIAMS

HE MUSTA THOUGHT THEM SHAFTS FALLIN' WAS A BOMBIN' RAID! I THINK A PERSON KIN FOLLOW THAT WAR DOPE TOO CLOSE -- WHY, I BET TH' PEOPLE OVER THERE AIN'T THAT NERVOUS!
WELL, HE'S ONE OF TH' MANY WHO THINKS SOME OF THEM BOMBERS IS GOIN' TO MISTAKE THE ATLANTIC OCEAN FER THE ENGLISH CHANNEL!
9-20
J.R.WILLIAMS
THE ATLANTIC CHANNEL

the courts shall subsequently determine to be reasonable."

The petition said that the contracts were advantageous to both the Government and the company.

↓ ↓

Washington

Plans and designs for the construction of aircraft have been added by President Roosevelt to the list of items which are subject to the export license requirements of the May-Sheppard Act. The President's proclamation of May 1, 1937, subjected the exportation of aircraft and engines to the licensing system but plans and designs for their construction had never been covered heretofore.

Aircraft plans and designs were defined in the proclamation to include:

"Plans, specifications, and other documents containing descriptive or technical information of any kind (other than that appearing in any form available to the general public) setting forth the design or construction of aircraft or aircraft engines."

↓ ↓

Washington

The Bureau of Reclamation has awarded a $105,380 contract to the Star Iron & Steel Co., Tacoma, Wash., for one gantry crane to be used in handling bulkhead gates and hoists at Grand Coulee Dam in Washington.

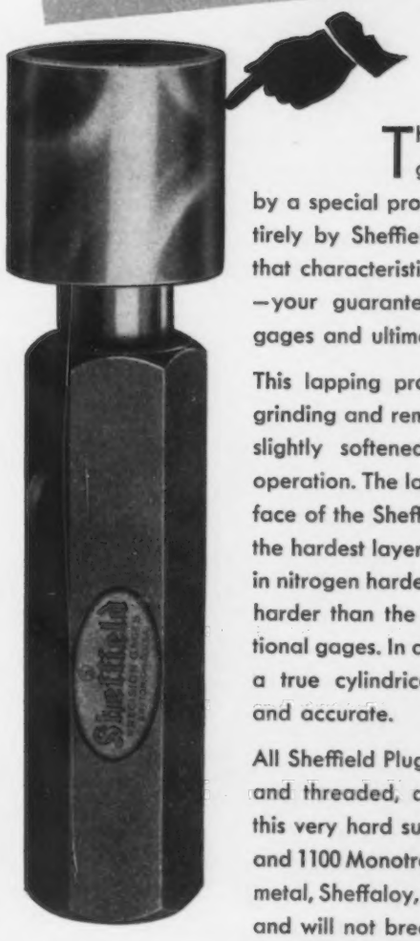
The bureau also placed a $119,778 order with Norris Bros., Burlington, Wash., for furnishing and erecting the superstructures of three bridges necessary in rerouting the Great Northern Railway around Grand Coulee Dam's 151 mile reservoir.

↓ ↓

Washington

• • • **The National Labor** Relations Board has certified the Amalgamated Association of Iron, Steel and Tin Workers as the sole bargaining agent for employees of the Consolidated Steel Corp., Ltd., at its Maywood plant, Los Angeles County, California. At an election the SWOC's affiliate received 478 votes compared with 93 for the AFL affiliate and 47 for the Employees Association of Consolidated Steel Corp.

THAT HIGH-LIGHT PATTERN MEANS SHEFFIELD



THE SHEFFIELD plug gages are lapped by a special process developed entirely by Sheffield, which produces that characteristic high-light pattern—your guarantee of the finest in gages and ultimate gage economy.

This lapping process follows finish grinding and removes the outer skin slightly softened by the grinding operation. The lapping takes the surface of the Sheffield Gage down to the hardest layer of metal produced in nitrogen hardening—considerably harder than the surface of conventional gages. In addition, it produces a true cylindrical surface, smooth and accurate.

All Sheffield Plug Gages, both plain and threaded, are Nitrigages with this very hard surface (between 900 and 1100 Monotron Brinell). The base metal, Sheffaloy, is tough and ductile and will not break or chip on accidental impact.

Standardize on Sheffield Gages for maximum economy.

SHEFFIELD
GAGE CORPORATION • DAYTON, OHIO, U.S.A.
MASTER GAGEMAKERS
NITRIGAGES

Fatigue Cracks

BY A.H.DIX

Coals of Fire

• • • Two weeks ago we chided your Washington eyes and ears, Leon Wesley Moffett, for the use of the italicized word in his Washington report:

> ". . . should the President's *primogeniture* ascend the throne, Mr. Wallace undoubtedly could expound the New Deal philosophy. . . ."

The word should have been *primogenitor*, we said. "Moff" writes:

> *"I am reminded of Boswell's tale about pompous Dr. Sam Johnson. It seems the doctor was peeved because he thought the reading public did not appreciate his literary efforts. The king called the doctor to Buckingham palace and expressed the hope that the doctor would not, in his despair, give up writing, for to do so would be a major calamity in the field of literature. Johnson's friends asked him what he replied. 'Who am I,' he said grandly, 'to bandy trivialities with my sovereign.'"*

He then suggested that we consult the dictionary. We did, and are sorry to find he is right. The *primogenitor* is the old man himself and *primogeniture* is the state of being the first-born, which is exactly what the Washington word wizard meant. Our thorax is black and blue.

Three-Point Landings

• • • An anonymous contributor who signs himself "Deac" writes:

> "I can find a flaw or two in your tribute to 'Moff.' The Venus de Milo is certainly, not a little, but a lot, too thick in the thigh. In fact, she is a slab-sided momma fitter for the washboard than the (censored).
>
> "Speaking of neat word-groupings, here are some of my favorites, picked up here and there:
>
> "Description of a second-hand plane—**'She takes off like a homesick angel.'**
>
> "Remark by a disgruntled customer—**'If the manufacturer had been present, I would have been strongly tempted to tamper briskly with his longevity.'**
>
> "Said of a pussyfooting politician—**'He could dance silently on a bass drum.'**
>
> "Comment by a trout fisherman who was experimenting with a deer-hair bug instead of the conventional delicate fly —**'When it hit the water it sounded like throwing a cigar box on a state road.'**"

Tomato—Ripe, Canned

• • • Doesn't alert, aggressive "World's Greatest Industrial Paper" know that advances in the manufacture of printing ink and processing machinery make it possible to avoid unsightly pages like the ones attached?—**F. C. Cole, Advertising Manager, Dravo Corp., Pittsburgh.**

Alert, aggressive W.G.I.P. beats breast and bemoans the fact that although printing experts say its plant is one of the best in the country, a besmudged copy occasionally will creep through. Reason given by printers, who are notoriously able alibiers, is the speed with which late forms are handled. Tuesday midnight has passed before the last form is put to bed, and by 10 o'clock Wednesday morning the issue is in the mail trains—a neat trick with a 204-page issue like this one.

Epigram

• • • Somebody in the S. J. Gardner Foundry & Machine Co., New Albany, Ind., sends in a folder issued by the McCabe & Sheeran Machinery Co., with this encircled, *"ALL NEW Machinery is built with USED Machinery,"* and queries "Stopper?"

Definitely.

Stopper

• • • Daddy! Why is the top of the world so dirty?—*Cutler-Hammer.*

Super-Slogan

• • • Manufacturers of typewriters have shushed their product to the point where you can doze peacefully with one operating as near you as 15 ft. But adding machines of the listing variety still annoy the ear drums. To the manufacturer who invents a reasonably quiet one we bequeath a brilliant slogan we just thought up—*"A machine you can count on not to disturb you."*

They Looked Down Their Nose

• • • We are alarmed to have readers tell us that, minus the advertising, your favorite family journal's value to them would be cut 50 per cent. Some of them are unkind enough to specify an even larger discount. If he were alive today, this would cause our founder, John Williams, to turn over in his grave—to steal a solecism of Boake Carter's, picked up by the *New Yorker.*

In the early days of the periodical publishing business, advertising was taken on sufferance, like pretzels at a W.C.T.U. Coca-Cola binge. As the art of selling in print improved it ran the gamut from toleration to admiration. Although it is foolish to expect an unprejudiced opinion from us, in no phase of advertising has progress been so marked as in the industrial publications.

This admission of the obvious is made now because so many of the men responsible are in congress assembled at the National Industrial Advertisers' Association's convention in Detroit. We salute them in a frightened sort of a way, viewing with dismay the competition with the editorial pages fifteen years hence, if the strides made in the last fifteen are duplicated.

They Played the Double Zero

• • • Speaking of typographical errors, our contemporary, "Marksman," of the English *Foundry Trade Journal,* who says he encountered a policeman on a dark country lane putting out glow worms that were violating the Defence of the Realm Act, reports that he found this in a report of a United States committee on malleable castings:

> This report has been submitted to letter ballot of the committee, which consists of 36 members; 00 members returned their ballots, of whom 00 have voted affirmatively and 0 negatively.

Double Talk

• • • So intense is the passion of some individuals for your favorite family journal that they are reduced to incoherency. Or how else can you account for a letter like this just received from an upstate New Yorker?

> $1 enclosed for some more copies of IRON AGE. Through my interest as a salesman not a Peddlar, as some may judge wrong don't mind their own Business. By words or deeds to the King or Women to a Queen. I get a whole lot from these Issues Beats all Lodge Ritual."

Passport

• • • This memo was attached to a contribution that just came in from England:

> *To the Censor: This is to certify that the enclosed article requested by the American journal,* THE IRON AGE, *is not of "value to the enemy."*

Puzzles

• • • Speaking of typographical errors, we apologize for dropping a decimal point in the Aug. 22 cockroach problem. The roach traveled 56.14 ft., not 5614.

Last week's farmer's field was 2 2/5 ft. long, making the fence 28 4/5 ft. long, and the area of the field 28 4/5 sq. ft.

If you can do this in your head in 90 seconds you are much smarter than we are:

> *Two bicycle riders race with each other on a circular track. The first rider can complete one trip around the track in six minutes, and the second in four minutes. After how many minutes will the second rider overtake the first?*

THIS is a picture of a rotor from a Fairbanks-Morse Motor

Notice the squirrel cage winding!

It is of copper. The *one* metal most desirable, electrically and mechanically, for meeting the severe service a modern motor must withstand. Copper, the *one* metal of low resistance and low thermal expansion—best able to withstand high temperatures caused by constant plugging and reversing service.

Note further that this copper is *centrifugally cast* into a one-piece winding. *Centrifugally cast* to imbed the winding into the core slots deeply and tightly.

Then, after casting, this rotor is machined and dynamically balanced to the famed Fairbanks-Morse standards of precision.

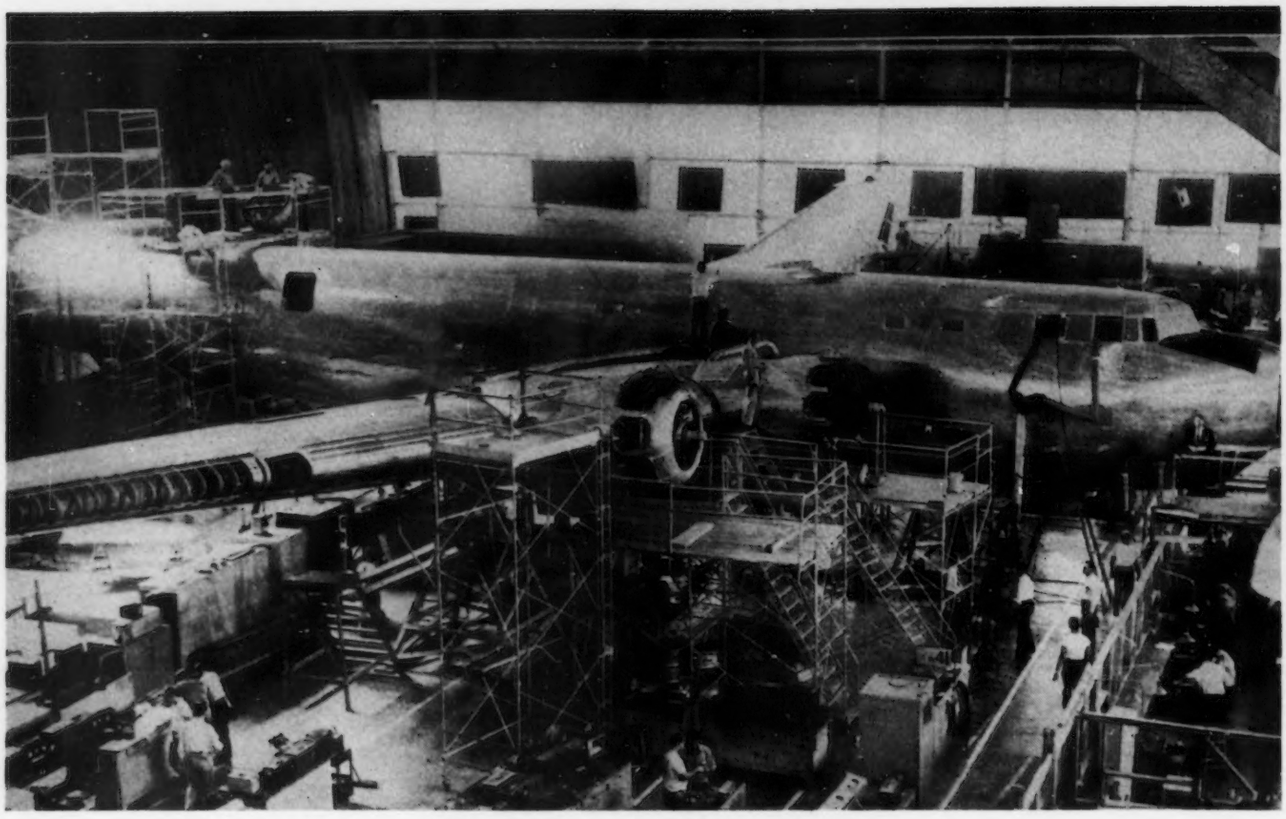
Only Fairbanks-Morse makes rotors with copper windings which are centrifugally cast. The Copperspun Rotor is an exclusive Fairbanks-Morse development, process, and feature.

For complete information on F-M Motors with Copperspun Rotors, write Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Ill. Branches and service stations throughout the United States and Canada.

7708-EA40.153

FAIRBANKS·MORSE MOTORS

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS



News of Industry . . .

Half Germany's Steel Capacity in Areas Reported Bombed by British

EDITOR'S NOTE: *Dislocation of Germany's steel industry as a result of continued heavy raids by British bombing planes is discussed in the following dispatch from an* IRON AGE *correspondent in Portugal. He reports that the Ruhr-Rhineland district, which has in some years produced more than two-thirds of the Reich's steel output, is now providing less than 20 per cent of armament requirements of the German army. Some steel-producing centers listed as not bombed prior to Sept. 2 have since been reported as targets of British planes.*

Lisbon, Portugal

• • • **Considering the war** in the air, it is of interest to investigate the dislocation of the German iron, steel and armament industry. At present the following regions, where iron and steel and armament are produced in Germany have not yet been subject to aerial attacks:

LARGEST BOMBER in the world, the plane shown at the top of this page is under construction at the Douglas Aircraft plant at Santa Monica, Cal. The plane, capable of carrying 18 tons of bombs, spreads 212 ft. and is powered with four 2000-hp. engines. (Photo by International.)

Luebeck-Stettin and the other Baltic Coast ports representing 3.8 per cent of the German iron and steel production, Saxony 2.2 per cent, Central Germany (Salzgitter, Braunschweig-Peine, where the steel works up to Sept. 2 had not been attacked) 5.2 per cent, Berlin 1.3 per cent, Lower and Upper Silesia 9.3 per cent, Eastern Mark 5.3 per cent, Bohemian Moravia 6.9 per cent, Bavaria 0.8 per cent, the Saar district 8.3 per cent, the Southern Westphalian districts (Siegerland, etc.) 6.3 per cent.

To these, but in the total production rate not yet included and therefore not considered must be added Luxembourg and Lorraine, which together represent about 15 per cent of Germany's steel capacity.

As regards the armament industry the proportion is far more advantageous, as in 1937-38 a large

number of works were shifted from West Germany to Thuringia, Mecklenburg, Silesia, Bavaria and in 1938-39 to Eastern Mark and the Sudetengau. In Bohemian Moravia the Skoda-Zbrojovka works are able to supply about 35 to 45 per cent of the armament requirements of the German army, but are working only to some extent for the German army, as a large fraction is for export (the Balkans, Russia, Spain and other countries).

The armament industry in Ruhr-Rhineland, which during the World War supplied between 70-80 per cent of the army requirements is at present hardly supplying more than 20 per cent, as also large parts of the Krupp works had been long decentralized, same as the oil depots of Bremen-Hamburg, etc., had been already in 1939 brought into the interior.

The German iron and steel industry has intensified its export drive and is now selling without rationing of supplies to countries which formerly got only rationed supplies. Germany is taking less iron ore from Sweden and more timber, pulp, copper. It is no secret that together with Rumania she is also supplying the needs of Italy for oil and petrol, the present production of synthetic petrol being already in excess of peacetime requirements. The shipment times for steel have been reduced and are now: Ingots 10-12 weeks, merchant bars and reinforcing bars, 6-8 weeks, joists 4-6 weeks, heavy plates 8-10 weeks, sheets 6-8 weeks, steel tubes 4-6 weeks, wire products 8-10 weeks. Ship plates are still not sold, but wire rods and hoops are again sold at 6-8 weeks delivery time.

The traffic with Japan in alloy steels, high quality steel wires, wire mesh, etc., is at present at about 50 to 60 per cent of peacetime quantities and contracts on a large scale have been renewed. Immigration of Belgian workmen reached 31,000 and of Dutch 26,000 up to the end of August, many of them industrial and mining men.

As regards the amount of business done overseas, particularly Latin America, nothing can be revealed for reasons easily understandable, but it can be said that the amount is as yet small.

K. T. KELLER, Chrysler Corp. president, starts the first tractor to be used in clearing the ground for the Army Tank Arsenal which Chrysler is building and will operate for the Army. (Sept. 11, 1940.) Standing behind the tractor, left to right, Herman L. Weckler, Chrysler vice-president and general manager; Major R. Z. Crane, U. S. Army executive officer in the Detroit Ordnance District; J. A. Moriarity, construction engineer for the Q. M. C.; Lieut. Col. H. W. Rehm, representing the War Department, and Fred M. Zeder, vice-chairman of the board, at the controls.

Coming Events

Sept. 18 to 20—National Industrial Advertisers Association, annual conference, Detroit.

Sept. 18 to 20—Grinding Wheel Manufacturers Association, Abrasive Grain Association, meeting, Osterville, Mass.

Sept. 19 to 20—Concrete Reinforcing Steel Institute, semi-annual meeting, Skytop, Pa.

Sept. 24 to 27—Association of Iron and Steel Engineers meeting and exhibition, Chicago.

Oct. 2 to 5—Electrochemical Society, Inc., fall meeting, Ottawa, Canada.

Oct. 7 to 11—Twenty-ninth National Safety Congress and Exposition, Chicago.

Oct. 13 to 16—American Gear Manufacturers Association, semi-annual meeting, Skytop, Pa.

Oct. 16—Porcelain Enamel Institute, fifth annual forum, Urbana, Ill.

Oct. 17 to 19—American Society of Tool Engineers, semi-annual meeting, Cincinnati.

Oct. 21 and 22—Associated Machine Tool Dealers of America, annual convention, Dayton, Ohio.

Oct. 21 to 25—National Metal Congress, Cleveland.

Oct. 25 to 26—Foundry Equipment Manufacturers Association, annual meeting, Hot Springs, Va.

Oct. 31 to Nov. 2—Society of Automotive Engineers, national aircraft production meeting and exhibition, Los Angeles.

British Steel Output At Peak Despite Raids

London

• • • **Ample supplies** of raw material being available, British steel production continues at a record rate, while the output of pig iron is increasing weekly. Supplies of domestic ore show a steady increase, especially in the Midland counties, and in a number of instances last year's output has been more than doubled.

On the northeast coast the issue of pig iron licenses is very strictly controlled and as a result it is difficult to obtain supplies for ordinary industrial purposes. The large output of east coast hematite is rapidly disposed of, the bulk of supplies going to local steel mills and little being left for shipments to other districts. Export business is at a standstill.

On the northwest coast there has been a steady trade in hematite, local consumers taking about two-thirds of the supply and the remainder being eagerly taken by other districts. The demand for pig iron in the Midlands is growing more insistent, but so far requirements have been met with little delay. The heavy engineering and allied foundries are mak-

ing still heavier calls for supplies of low-phosphorus iron and hematite, The possibility of importing still larger supplies from America and elsewhere is being seriously considered. Trade in high-phosphorous forge iron has been more active as a result of the heavier tonnages absorbed by bar iron producers. The latter are heavily booked forward.

Finished steel is in steady demand from structural engineers, who have a vast amount of work in hand for the government, and there is also a continued keen inquiry from the chief shipbuilding centers. Enemy air raids will cause no slow-down of the shipbuilding program, as a plan for the voluntary transfer of shipbuilding and ship-repairing labor from one yard to another has been worked out by the Ministry of Labor and National Service. It is to meet the possibility of some yards becoming useless through enemy action that the plan has been prepared.

Supply Minister Sidesteps Thomas-Firth Dispute

London

• • • **Herbert Morrison,** British Minister of Supply, has refused to interfere in the dispute between Richard Thomas & Co., £20,000,000 Welsh steel and tin plate combine, and Sir William Firth, who was dismissed from the chairmanship of the firm. Mr. Morrison declared that the productive resources of the combine were being used in such a way as to give the greatest help to the national war effort.

"My business is the production of munitions of war," he said. "That is the only question with which I am concerned."

British Form New Steel Export Groups

London

• • • **Two new Export Groups** have just been formed in Britain in connection with the government's drive to increase the country's export trade. They are the Steel Castings Export Group and the Steel Wire Rope Export Group, both with offices at Church Street, Sheffield.

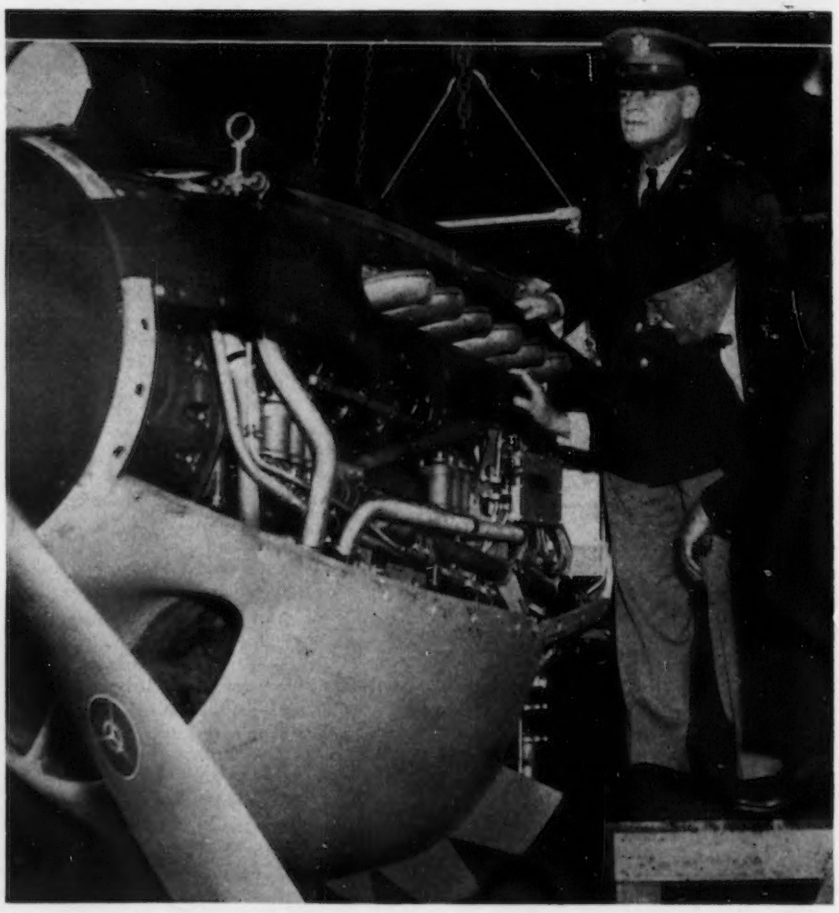
British Open Buying Office in Washington

• • • **The British Purchasing** Commission, whose headquarters in the United States is at 15 Broad Street, New York, has opened offices in Washington, having taken an entire floor in the Willard Hotel there. It is reported that Arthur Purvis, head of the commission, will divide his time between the New York and Washington offices.

For the past three months steel purchases for the British government have been handled by the British Iron & Steel Corp., which has offices at 37 Wall Street, New York, in charge of I. F. L. Elliot, who for many years has been managing director of the British Iron and Steel Federation. This organization, which in Britain corresponds to the American Iron and Steel Institute, organized the British Iron & Steel Corp. several years ago as a subsidiary to handle commercial transactions.

Under the program which prevailed before the war, the British Iron & Steel Corp. was the purchaser of the large tonnages of scrap which were shipped from the United States to the International Scrap Convention of Europe, which was composed of several of the leading steel producing countries of Europe, including Britain, Germany, Italy, Poland and others.

After the outbreak of the war the British Iron & Steel Corp. assisted the British Purchasing Commission in the purchase of steel abroad, but its operations were conducted from London.



WILLIAM KNUDSEN, chairman of the production division of the National Advisory Defense Commission, and Maj. Gen. H. H. Arnold, Air Corps chief, are shown inspecting a P-40 Allison-powered pursuit ship during a visit to the Curtiss-Wright plant at Buffalo. Six such ships are being turned out daily. By April 1, 1942, Mr. Knudsen said, the U. S. military forces will be equipped with 19,000 new fighting planes, the British with 14,000 from the U. S. (By International.)

Nation's Rearmament "Leisurely" Ayres Says

• • • **Efforts of the** United States to rearm in 1940 have been "decidedly leisurely" as compared with those of 1917, according to Col. Leonard P. Ayres, vice-president of the Cleveland Trust Co., Cleveland. A pamphlet written by Colonel Ayres points out that records of our actual military expenditures are better guides for comparing the relative progress of our preparedness efforts in 1917 and in 1940 than are the reports of appropriations made or of contracts placed.

"If we consider the average monthly expenditures of the army during the first quarter of 1917," Colonel Ayres writes, "and in the first quarter of 1940, as being in each case equal to 100, we can make a tabular comparison showing how the two efforts gathered increasing momentum in the two periods. The comparison is as follows:

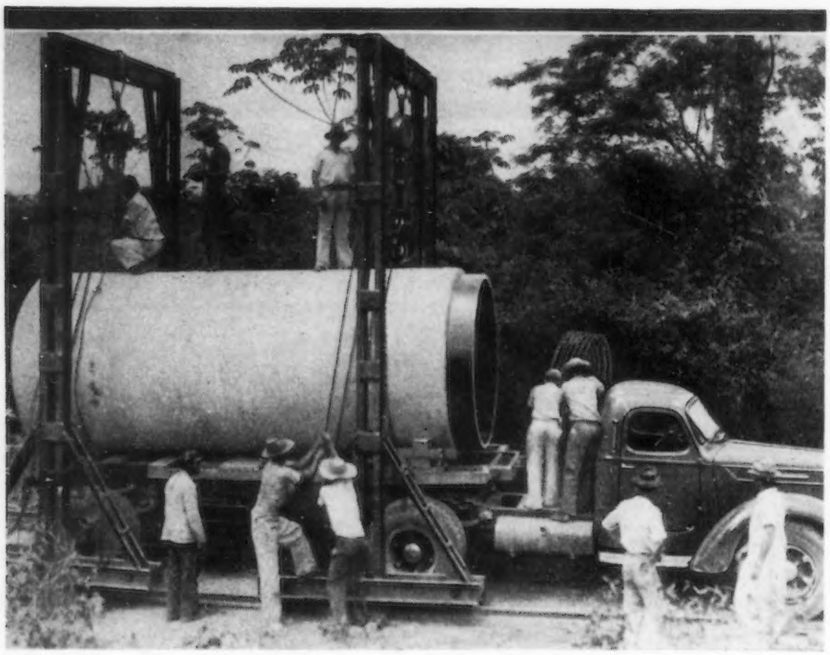
	1917	*1940*
1st Quarter	100	100
April	190	103
May	231	112
June	690	108
July	587	132
August	1559	153

"These figures mean that in the first five months of our preparedness effort in 1917 the acceleration in army expenditures was 28 times as fast as it has been in the corresponding months of 1940. The average monthly expenditure in the first quarter of this year is taken as being equal to 100, and by August it had advanced to 153, which is an increase, or acceleration, of 53 per cent. In 1917 the average monthly expenditure in the first quarter of the year is also taken as being equal to 100, and by August it had advanced to 1559 which was an increase of 1459 per cent, or 28 times as rapid an acceleration as that of 1940."

Many examples are given of the rapidity with which we produced ships and munitions during our participation in the First World War. "Prior to that war, as in recent years," according to the pamphlet, "it took us about two years to build a destroyer for the navy, and during 11 months of that time the hull was on the ways in the shipyard. In 1918 the destroyer Ward was launched with her hull 84 per cent complete just 17 days after her keel was laid, and was completed and accepted in 30 days. She is still in service and is one of the 50 destroyers just transferred to Great Britain. There were many other similar instances of speeds of production that had previously been considered utterly impossible, and are so considered now.

"No such impressive records of industrial achievement are being made in our present effort for preparedness. No one expects them, and no one even discusses their possibility. And yet if there are good reasons why we should now undertake this defense program as an essential part of our national policy, there are completely convincing reasons why we should be pushing it forward toward accomplishment just as rapidly as our military, naval, and industrial resources will permit."

A NEW 90-MM. anti-aircraft gun, first of its kind, is being inspected by Col. R. W. Case, left, commanding officer of the Watertown, Mass., arsenal, and Col. John Mather, production manager. Twenty-five hundred men are working at the arsenal which is on a 24-hr. day and 5-day week. (Photo by International.)



UNLOADING TUBES for the Ribeirao Do Lagas water line in Brazil.

Steel, Welding Equipment from U. S. Used in Brazil's New Water Line

Rio de Janeiro, Brazil

• • • **Steel and welding equipment** from the United States played an important part in the new 60-mile aqueduct recently completed to bring water from the mountains to this city, capital of Brazil.

This project, known as the Ribeirao Do Lagas Line, required 13,000 huge steel and concrete tubes, each weighing 22,000 lb. The steel included 7966 metric tons of hot rolled sheets 9 to 14 gage, made by the American Rolling Mill Co., Middletown, Ohio, and supplied through their overseas affiliates, the Armco International Corporation. Twenty-six Lincoln SA-150 ampere welders and 60 metric tons of Fleetweld No. 7 welding electrodes, a product of the Lincoln Electric Co., were used.

The line was laid over a hilly route by S. A. Industrial de Tubos of Senador Camara, with Sr. H. Fillios, director gerente of the firm, supervising the job. It required 168,972 feet of 69-in. pipe and 49,215 feet of 59.1 pipe.

Each tube consisted of three sheets and was so arranged that only a minimum amount of welding was necessary. The two diameters of tubes required 34 and 31 meters of welding respectively and used Fleetweld No. 7 in sizes ⅛-in. x 14 in. and 5/32-in. x 14 in., depending on the thickness of the metal.

Twenty-three of the 26 Lincoln welding machines were employed in action at one time. When it was found that the three remaining machines were unnecessary as spares in case of a breakdown, these extra machines were put to work on maintenance jobs.

Fifty to 60 Brazilian welders were on hand at all times. Most of these men had never been connected with welding in any form prior to this project.

The general fabrication of the "Bonna" type conduit was quite simple. The sheets as received were first checked and squared. The squared sheet was rolled into a cylinder which had holding devices inside and out designed and constructed at Senador Camara for this work. The cylinders were tack welded and moved to the floor where they were placed in a cradle to hold them in shape during the welding of the lengthwise seam.

Upon the completion of the separate cylinders they were assembled on another floor, internal bracing was added and three sections were placed together on a trunnion so that the circumferential welds could be made.

The outer coating of cement was cast over the exterior surface with a reinforcing member of wire in the cement. This reinforcing was of hot rolled rod wound on a suitable frame and spot welded. The conduit and reinforcing were placed in a split mold and after spacers were added the cement was poured to complete the tube. Later the mold was removed and the tubes stored to age.

Since all connecting joints are of the "Bell and Spigot" type, a small strip was welded to one end of each of the steel shells, permitting the tubes to be joined.

The tubes were transported singly in trailer trucks to their final location in the field. Special unloading devices removed the tubes from the trucks and deposited them at the point of assembly. The tubes were moved into place by tractors and rigs.

With 34 and 31 meters of welding per section of tube, there was a total of 450,000 meters of welding or 1,476,450 feet. Approximately one pound of Fleetweld No. 7 covered 11.16 ft. of welded seam or each foot required 0.0896 lb. of electrodes. By weight the welding electrodes were only 0.72 per cent of the weight of sheets.

The original schedule using 23 machines called for a production of 50 tubes per day, but with the improved handling and speed of Fleetweld No. 7 this was increased to 65 tubes per day plus all the necessary connections.

The improved production with Fleetweld No. 7 averaged 2300 meters of welding per ten hours a day.

Japan Depends on Imported Scrap

Tokyo, Japan

• • • **American restriction** on scrap exports touches one of the sorest spots in Japan's war industrial setup. A long-range examination of Japanese iron and steel statistics reveals that production of steel ingot and rolled steel has expanded much faster than output of pig iron. To plug the widening gap between blast furnace capacity and steel demand, Japan has imported scrap steel in mounting volume, in recent years as much as 3,000,000 tons annually, including 1,500,000 to 2,000,000 tons of American scrap. Since the outbreak of the European war Japan's dependence on the United States has tended to increase because other suppliers (Australia, Canada, India) have tightened up on exports.

With no long steel making history back of her, Japan has but little domestic scrap in the junk yard sense. Foundry scrap, turning scrap and defective war materials aggregate about 1,500,000 tons a year. This compares with an annual consumption of more than 4,000,000 tons, equal to 65-70 per cent of Japan's steel output.

Tokyo estimates that the qualitative restrictions on scrap exports now in force in the United States will skim off 20 per cent of the normal supply, with further incursions in sight. This would be equal to 400,000 tons annually. On the surface, this means 400,000 tons less steel for Japan. Actually the drop in production is likely to be heavier. The present steel capacity is calculated on the basis of a furnace charge composed of two-thirds scrap and one-third pig iron. Less scrap and more pig means lower efficiency in the type of basic open hearth furnace universally used in Japan.

But even pig iron production Japan has found difficult to step up, partly because of the temporary loss of several important Chinese iron mines, partly on account of the coal and coke bottleneck. It is estimated that blast furnaces today operate at less than two-thirds of nominal capacity, and this ratio is declining as new blast furnaces near completion with no materials on hand to charge them. Hopes were pinned early this year on a trade agreement with Soviet Russia, under which Japan was to buy Russian coking coal and pig iron, but the trade talks in Moscow came to a deadlock soon after they started.

How Japan Depends On U. S. for Scrap

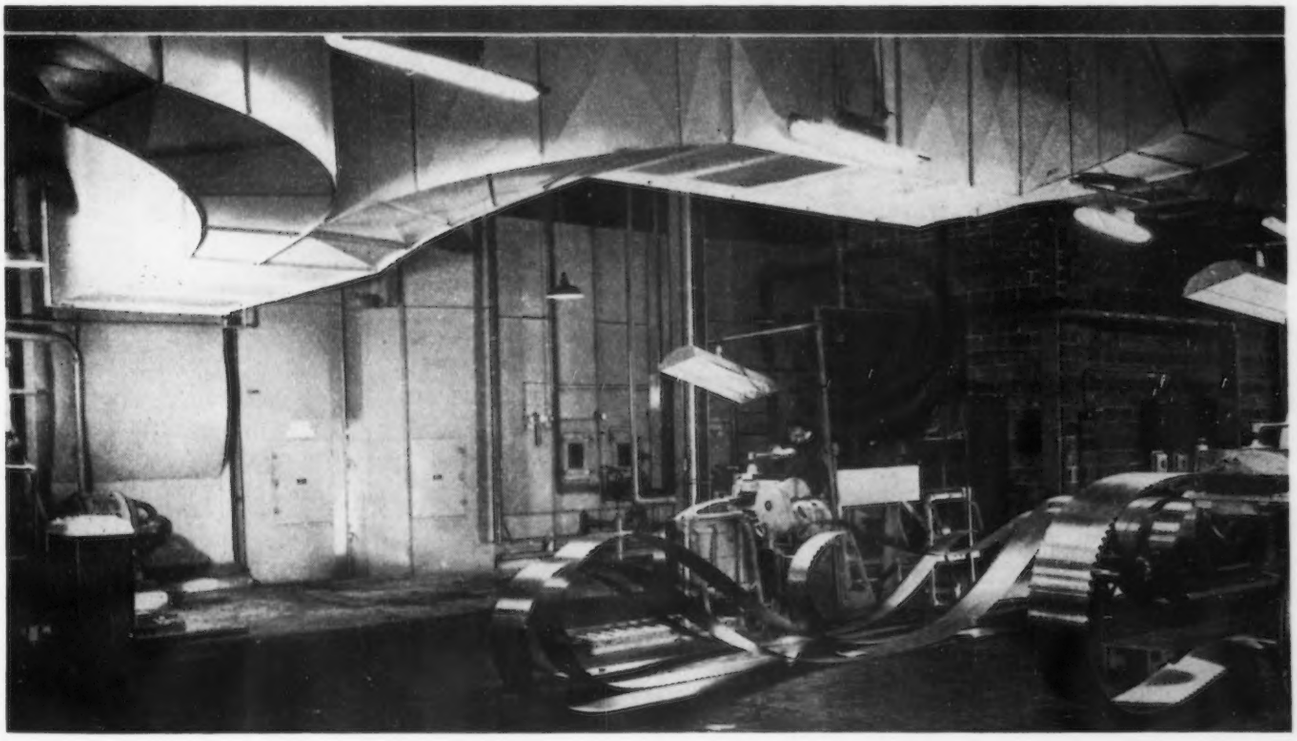
• • • **The following table indicates the extent to which Japan's steel industry has come to depend on American scrap in recent years:**

(Thousands of tons)

	Steel Ingot Production	Scrap & Old Iron Imports (Total)	Scrap Imports From U. S.	%
1929	2,294	488	208	9
1930	2,289	489	168	7
1931	1,883	296	48	3
1932	2,398	559	164	7
1933	3,203	1,013	548	17
1934	3,907	1,413	1,168	30
1935	4,937	1,692	1,118	23
1936	5,228	1,497	1,058	20
1937	5,260†	...	1,905	36
1938	5,400†	...	1,382	26
1939	5,000†	...	2,071†	41

†Estimate.

FOUR LARGE air-conditioning units like the one shown behind these skilled craftsmen, who are putting the final touches on wide band saws destined for a lumber mill, circulate 400,000 cu. ft. of air per minute through the Simonds Saw & Steel Co.'s new windowless factory at Fitchburg, Mass. *(Photo by Austin Co.)*



Brazil Reported Producing Coke From Its Own Coal

Washington

• • • **Experts in Brazil** are reported to have obtained good results in producing coke from coal, giving rise to the hope that the country's expanding iron and steel industry may have at its disposal a dependable supply of Brazilian metallurgical coke.

A report from the American Commercial Attache in Rio de Janeiro to the Commerce Department said that the coke was obtained from coal mined in Santa Catharina, and that the processing work, consisting of selecting and washing in jigs, practically eliminated all pyrite, after which distillation followed in ovens. The resultant coke was described as being of good appearance, brilliant and resistant.

Schedule of Scrap Chapter Meetings

• • • **Meetings of local chapters** of the Institute of Scrap Iron and Steel Inc., have been scheduled as follows:

Sept. 23—Cincinnati chapter at the Hotel Gibson, Cincinnati. Henry D. Israel, of The Israel Bros. Co., Dayton, Ohio, president of the chapter, will preside.

Sept. 25—Michigan chapter at Detroit. Milton K. Mahler, of Morrow Steel Co., Detroit, is president of the chapter and will preside.

Sept. 26—Western New York chapter at Buffalo. Nathan H. Jacobs, of Buffalo House Wrecking & Salvage Co., Buffalo, chapter president, will preside.

Armstrong-Blum to Double Factory Space

• • • **Armstrong-Blum** Mfg. Co., Chicago, manufacturers of hack sawing machines, band sawing machines, hack saw blades and kindred tools, have started construction of an addition to their modern plant that will increase manufacturing floor space and capacity neary 100 per cent.

OFFICIALS OF THE Pratt & Whitney Division of United Aircraft Corp. gathered recently for the latest addition to Pratt & Whitney's plant at East Hartford, Conn. H. M. Horner, general manager, is shown below, Governor Raymond Baldwin, of Connecticut, is above at the controls of a steam shovel.

Meehanite Founders to Study Armament Castings

• • • **Distribution** of service data concerning use of Meehanite castings in British armament work to American licensees will feature the annual meeting of Meehanite Research Institute of America, to be held in Milwaukee, Oct. 31 to Nov. 1.

Varied Subjects Will Be Covered at A.G.M.A. Meeting

• • • **Credit unions,** trade associations and anti-friction versus plain bearings in gear cases are among subjects which will be discussed at the semi-annual meeting of American Gear Manufacturers Association, Skytop, Pa., Oct. 14 to 16, D. W. Diefendorf, program committee chairman, announces. Other subjects to be covered will be the motion characteristics of silent chains and metals used in worm gearing. Papers will be read by S. L. Crawshaw, E. S. Sawtelle, Philip P. Gott, H. A. McAninch and B. A. Miller. Dr. Charles Bartholomew will be the guest speaker.

Only 180 of 6149 PWA Projects Uncompleted

Washington

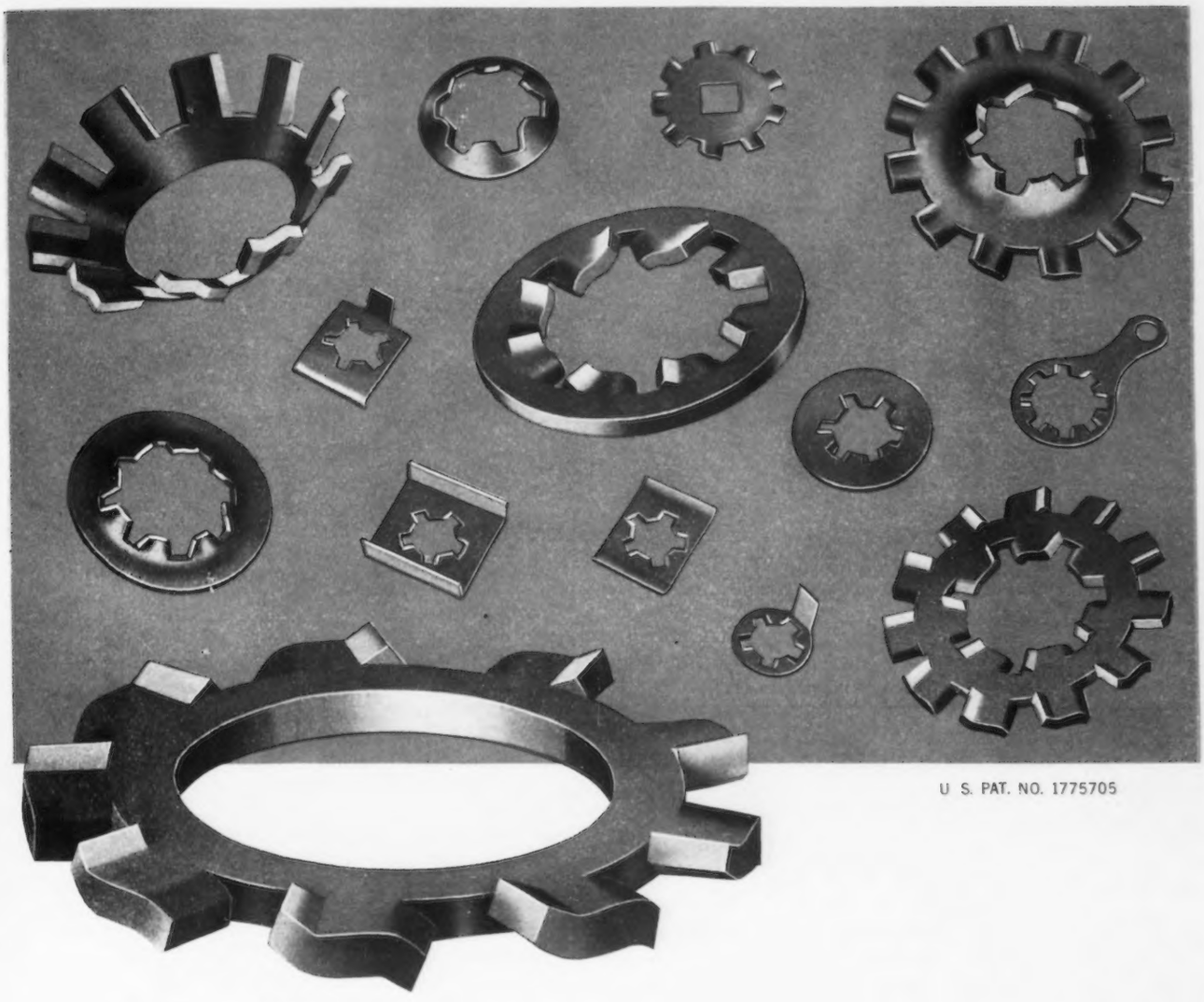
• • • **Reporting on the** construction status of the dwindling PWA program, Public Works Commissioner E. W. Clark said recently that of the 6149 non-Federal projects allotted under the 1938 law, only 180 are yet to be completed. It was reported that most of these, including the $51,000,000 Queens Midtown East River Tunnel and the $70,000,000 superhighway in Pennsylvania, are well on the way to completion.

J. & L. Installs Resistance Heating Unit for Spring Wire

• • • **A new product,** electromatic oil tempered spring wire, for special mechanical springs is now being produced by an electric direct resistance method by the Jones & Laughlin Steel Corp., Pittsburgh.

In contrast to the conventional methods of heating wire to quenching temperatures, either in furnaces or by immersion in molten baths, this process consists of passing sufficient electric current through the wire to heat it to the desired temperature, much as the coils in an electric toaster are heated by their resistance to the current. The electrical resistance set up in the wire increases its temperature uniformly, and the full cross-section of the wire is heated simultaneously to the desired quenching temperature. (See

STOP YOUR BOLTS, NUTS AND SCREWS FROM LOOSENING *with* EVERLOCK WASHERS



U. S. PAT. NO. 1775705

Washer Tongue Detail

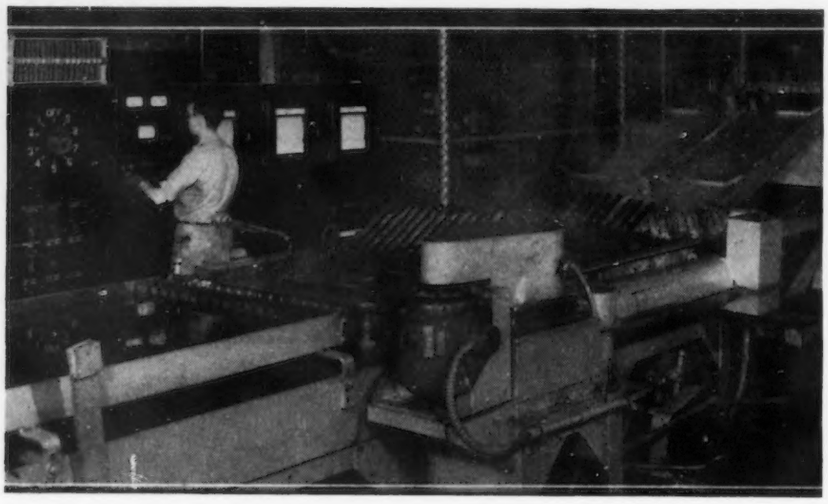
YOU can avoid the costly annoyance of loosened parts by using EVERLOCK WASHERS in your assemblies . . . The powerful spring tension of every EVERLOCK WASHER tongue coupled with the bite of its teeth, does the job more thoroughly than other types of fasteners . . . Pictured is an enlarged EVERLOCK tongue and a few of the different types that are used by the millions on a vast variety of products . . . Service calls due to loosened nuts, bolts and screws on equipment where EVERLOCK WASHERS are used, is unknown . . . There's an EVERLOCK WASHER of the correct type and size for every purpose.

Immediate Deliveries

OFTEN OTHER WASHERS HAVE BEEN TRIED, NOW EVERLOCKS ARE SPECIFIED

PRINTED IN U.S.A.

THOMPSON-BREMER & CO. 1640 W. HUBBARD ST., CHICAGO, ILL.



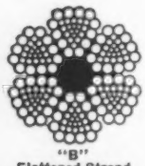
JONES & LAUGHLIN Steel Corp.'s new spring wire heat resistance unit is shown to the left. The process includes the passing of sufficient current through the wire to heat it to a desired quenching temperature.

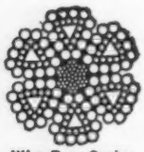
THE IRON AGE, Oct. 15, 1936, for extensive description of similar process.)

The new equipment handles a wide variety of gages, and is so constructed that wire fed from reels passes first through tension rollers then through a molten electrical contact. From there, the wire passes through a second molten contact, completing the electric circuit through the wire. These contacts are held at a constant predetermined temperature, the second also serving as a primary quenching bath from where the wire immediately passes to an oil bath for the final quench. This double-phase quenching feature provides a gradual reduction in wire temperature, preventing the steel from being shocked by a sudden great drop in temperature. Continuing from the final quench through a molten tempering bath, the wire is reheated to give it the desired physical properties and fatigue values. It may then be passed through a light soluble oil bath prior to shipment.

The constant flow of electric current of controlled voltage and amperage fed into the wire, together with the closely regulated speed of the machines, governs heating the wire to within very exact limits. The resulting combination of accurate time and temperature regulation makes possible precise control of the heating and quenching cycle.

Style B Flattened Strand


"B" Flattened Strand


Wire Rope Center

Steel Clad

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There is no guesswork when you use "HERCULES" (Red-Strand) Wire Rope. It is designed and built to do specific jobs better . . . safer . . . more economically. Furnished in a wide variety of constructions so as to be suitable for all purposes—each backed by 81 years of manufacturing experience and close cooperation with users.

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For maximum efficiency in Preformed Wire Rope, use Preformed "HERCULES". It is available in both Round Strand and Flattened Strand constructions.

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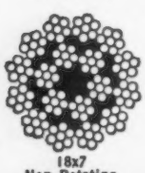

18x7 Non-Rotating

6x19 Filler Wire

6x19 Scale

6x37 Extra Flexible

8x19 Extra Flexible

Trade Notes . . .

Contract has been awarded to the H. K. Ferguson Co., Cleveland, by Kimble Glass Co., to design, build, and equip a batching, mixing and conveying unit to supply the existing glass manufacturing plant at its Vineland, N. J., factory. The building will be 177 x 60 ft., one story, structural steel frame, corrugated iron sides and roof, and concrete floors.

●

Sparks-Simplex Machinery Corp., Norwalk, Conn., engineering company, announces it has arranged for an initial production of 160 shell lathes a month and plans for rapid expansion of this production.

●

Cowles Detergent Co. has moved its executive and sales office to 7016 Euclid Avenue, Cleveland.

●

Claude B. Schhneible Co., Chicago, manufacturers of Schneible Multi-Wash dust collectors, entrainment separators, wearproof pumps and dewatering and settling equipment, has appointed H. L. Bullock of 136 Liberty Street, New York, as representative for the New York and Philadelphia areas.

●

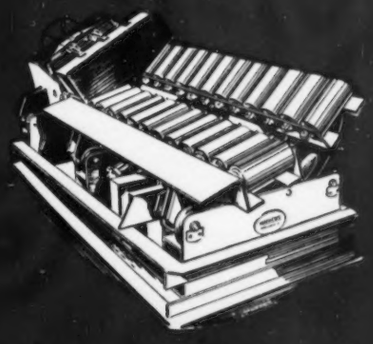
Raybestos-Manhattan, Inc., has purchased the Brighton Mills plant adjacent to the main plant of the Manhattan Rubber Mfg. Division at Passaic, N. J.

●

Universal Gear Corp., Indianapolis, announces the appointment of the Sintes Sales Engineering Co. of New Orleans, La., as representative for them in Louisiana, southern part of Mississippi and the Mobile section of Alabama, covering their line of Universal speed reducers.

MATHEWS CONVEYERS

Helping Steel with its Biggest Job



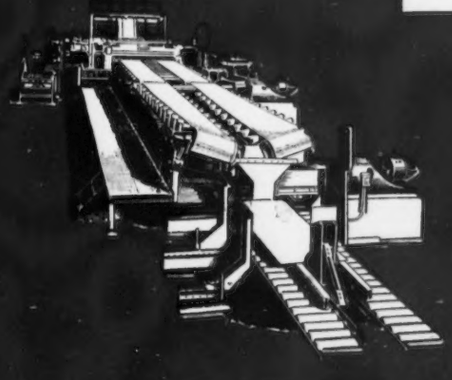
Side Tilter for discharging coils at right angles.

The plan for rearming America demands the rapid production of a vast amount of materials. A great share of the responsibility for this production has fallen to the Steel Industry. In fact, upon the ability of that industry to produce is hinged the success of this huge and vital armament program. Rightfully, then, Steel has been called "America's first line of defense."

The Mathews Conveyer Company, with greater facilities than ever before, is backing that line. Mathews engineers are working with Steel Plant engineers toward the application of conveying equipment which is designed to stand the coming months of severe service and abuse with a minimum of costly maintenance.

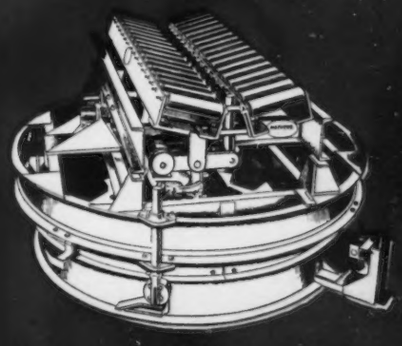
Mathews is glad for the opportunity to offer to the Steel Industry the experience gained from 35 years of engineering and manufacturing conveying equipment of high quality, and in this way help that industry to better serve the nation.

A Mathews engineer near your plant is eager to make your materials handling problem his own. We hope you will take advantage of his wide experience.



Belt Conveyer, troughed at end, for handling finished sheets from shear to piler.

Pallet Conveyer for handling hot or cold coils.



Power operated Turntable for changing the direction of coils as they move along conveyer line.

MATHEWS CONVEYER COMPANY

ELLWOOD CITY, PA.

PORT HOPE, ONT. SAN FRANCISCO, CALIF.

INDUSTRY GIVES FULL AID IN U. S. DEFENSE, PUBLIC FINDS

Washington

• • • **Despite political** attacks made on it and vote-seeking legislation to conscript it, industry is widely conceded to be cooperating with the government in the defense program.

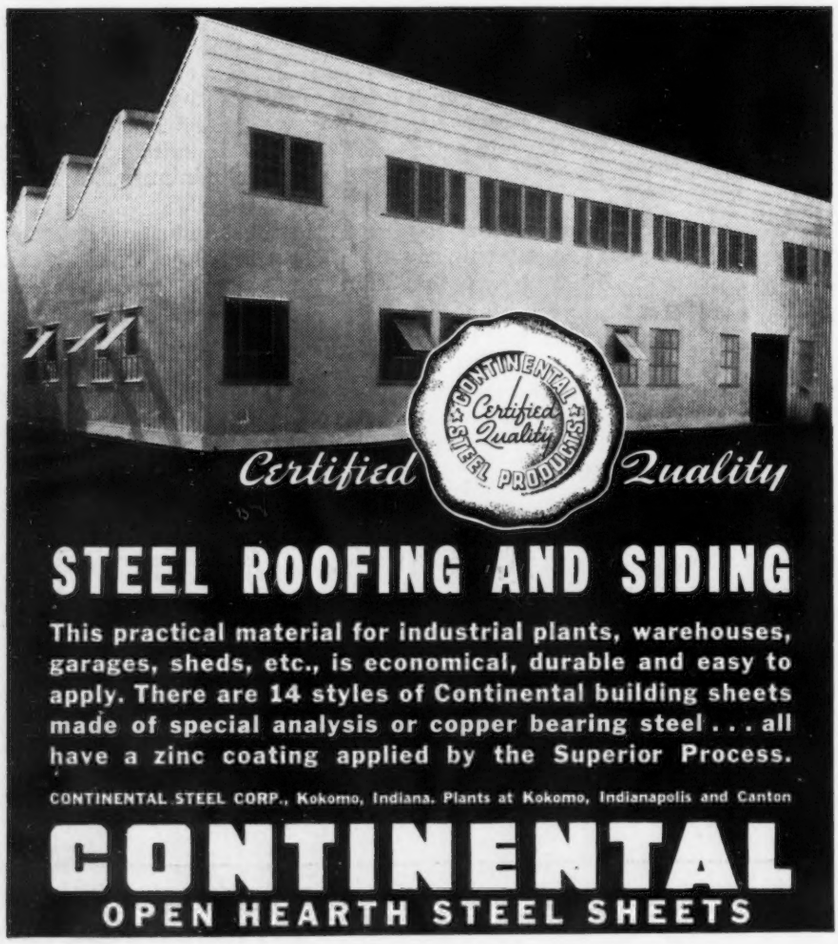
Loyalty, sense of duty and common decency would inspire it just as it would prompt the respectable citizen to do so. And from a purely materialistic point of view it would cooperate. For, as never before, its physical welfare, like the welfare of the country, is at stake. Losing that stake to the mad forces of Hitlerism would mean the loss not only of property but of freedom and therefore of all that is worth while.

So demagogic talk about business favoring appeasement, or about business being on a sit-down strike, is not only a cheap slur but it is senseless. Those who indulge in this sort of political ranting are, probably without realizing it, charging that industry is inviting its own destruction. The interesting thing is that while certain ones in this group are in the hustings trying to cultivate hate of industry their less-loving compatriots pay tribute to industry for its services to the government. It may not be intended but it has the appearance of playing both ends against the middle. The Government organizations having the most direct contact with industry—the National Defense Advisory Commission, War and Navy Departments — have not only expressed appreciation of industry's cooperation but have done everything in their power as a matter of mutual service to assist industry in getting the defense program under way.

These government defense units insist that voluntary cooperation rather than enforced action gets the best results from industry. The defense commission has studiously avoided any unnecessary regimentation. The time may come when emergency will require a system of control not now present, not because of reluctance on the part of industry but by reason of meeting pressing demands in the order of their importance. This would mean setting up a system providing for such things as allocation of tonnages, priorities and shipments. Even now preference classifications for obtaining machine tools have been set up but the plan has not as yet reached the point where the commission has had to turn to hard-and-fast priorities.

The commission naturally has set up a Price Stabilization Division, yet it has attempted no price control and is not expected to do so unless it finds that prices have moved to unjustified levels. Leon Henderson, who has taken some sharp cracks at industry, is head of the division, yet he appears to be following a definite course of restraint against price-fixing. He has guardedly sounded warnings against unjustified price increases and indicated that unless rises which are held to be unwarranted are halted government action will be taken. Only last week he hoisted a warning sign when he declared that the defense program does not justify any increase in lumber prices. Evidently desiring to nip an upward swing rather than to hastily crack down with government control, Mr. Henderson said that recent advances in lumber prices have been due to unfounded rumors of actual defense needs in the next 12 months. Whatever the merit of the rise in prices, it is clear that the defense commission does not propose to let advantage be taken of defense requirements to promote unjustified price increase.

The Consumer Division of the commission a short time previously warned retailers against price increases. While one spokesman for the division bluntly threatened government action to stop such rises, the idea of voluntary cooper-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Certified Quality
STEEL ROOFING AND SIDING
This practical material for industrial plants, warehouses, garages, sheds, etc., is economical, durable and easy to apply. There are 14 styles of Continental building sheets made of special analysis or copper bearing steel . . . all have a zinc coating applied by the Superior Process.
CONTINENTAL STEEL CORP., Kokomo, Indiana. Plants at Kokomo, Indianapolis and Canton
CONTINENTAL
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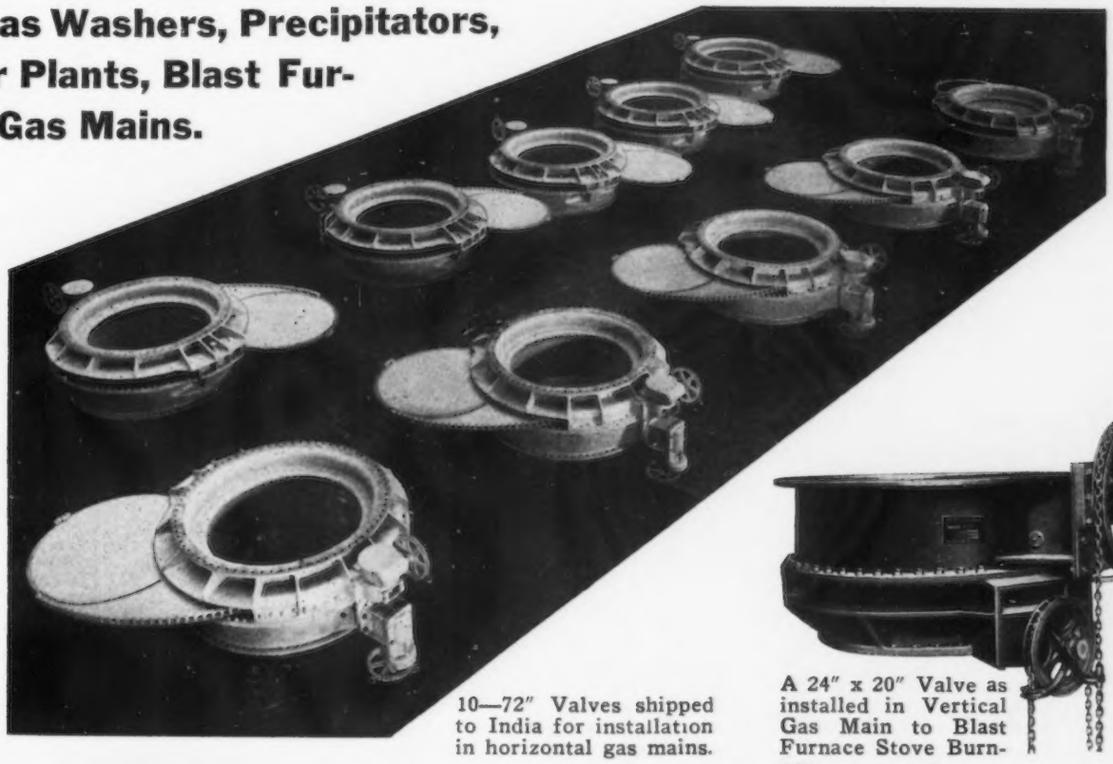
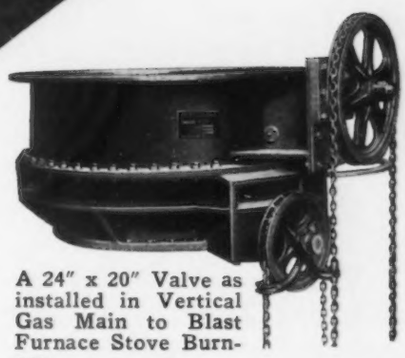
DEPENDABLE MECHANICAL VALVES

For Gas Washers, Precipitators, Boiler Plants, Blast Furnace Gas Mains.



10—72″ Valves shipped to India for installation in horizontal gas mains.



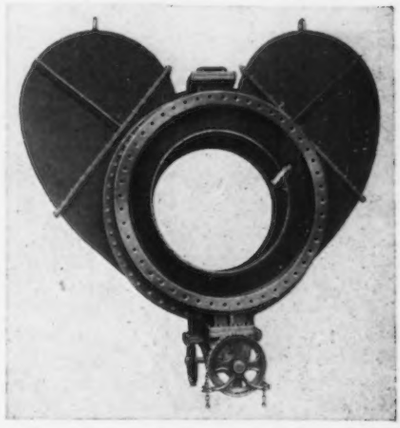
A 24″ x 20″ Valve as installed in Vertical Gas Main to Blast Furnace Stove Burners.

VALVE SIZES:

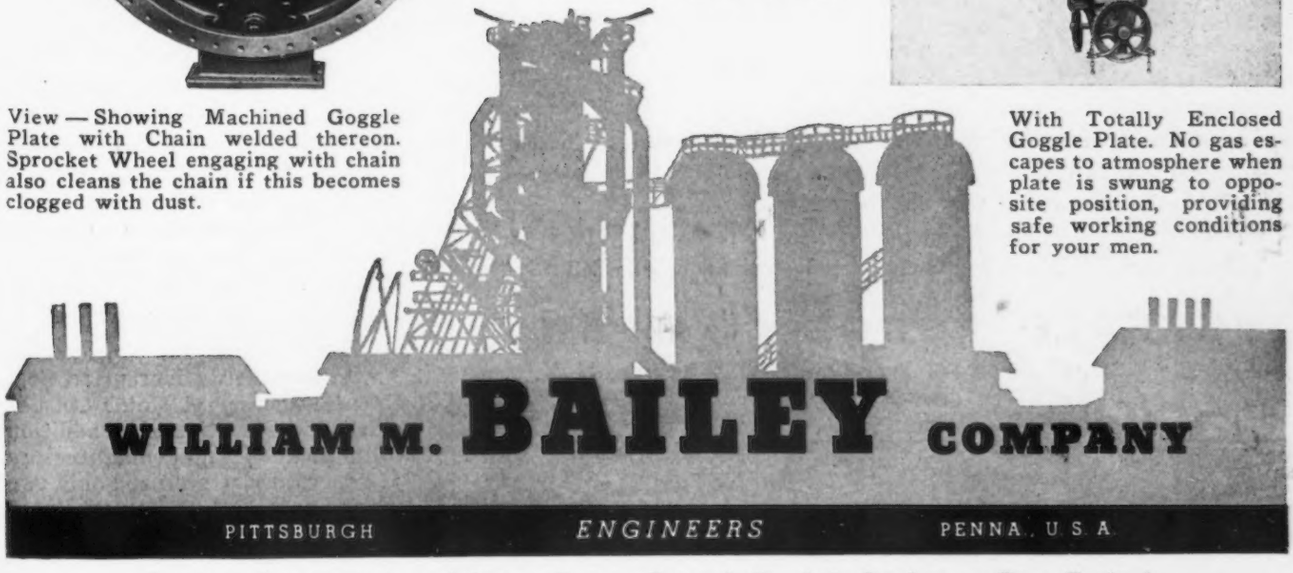
20″ Diameter
24″ Diameter
30″ Diameter
36″ Diameter
42″ Diameter
48″ Diameter
54″ Diameter
60″ Diameter
66″ Diameter
72″ Diameter

Write for our Valve Bulletin.

View — Showing Machined Goggle Plate with Chain welded thereon. Sprocket Wheel engaging with chain also cleans the chain if this becomes clogged with dust.



With Totally Enclosed Goggle Plate. No gas escapes to atmosphere when plate is swung to opposite position, providing safe working conditions for your men.



WILLIAM M. BAILEY COMPANY

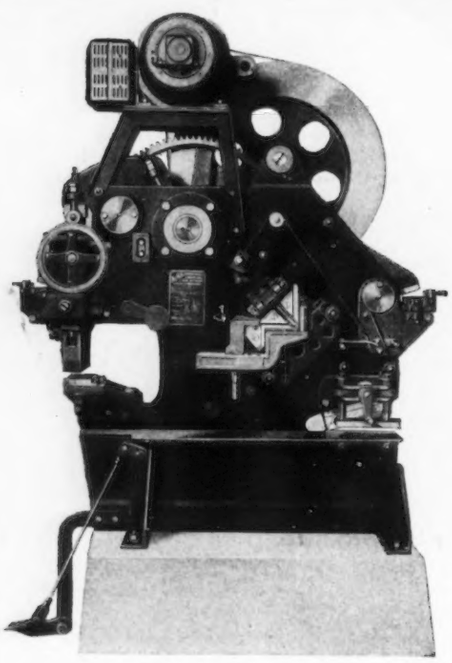
PITTSBURGH *ENGINEERS* PENNA. U.S.A.

European Representative: Ashmore, Benson, Pease & Co., Ltd., Stockton-on-Tees, England

ation instead of fast government control prevailed.

Fortunately this spirit guides the commission and despite loose charges against industry, the commission is finding cooperation is being given freely and that it is more successful in stimulating the defense program than would be the case were a rigid system of government control set up. And so long as the Government and industry cooperate as they are now doing there will be no need for such control and the conscription industry legislation, though distasteful in peace-time, will be on the shelf unused.

put your
METAL WORKING JOBS
on a **REAL** *production basis*



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PUNCHING
SHEARING
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COPING
NOTCHING

of
ANGLES
TEES
ROUNDS
SQUARES
FLAT STEEL

The versatility of the Buffalo UNIVERSAL Iron Worker makes it an outstanding cost-cutting tool in any shop where metal is worked. Hand methods can't compare with this rugged giant in speed, accuracy, economy. Here's an investment that's bound to pay you dividends for years to come! Write today for full details—ask for Bulletin 360.

BUFFALO FORGE COMPANY
492 Broadway Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" UNIVERSAL IRON WORKER

A BOOK REVIEW

Sidney Thomas' Life Revealed in Letters

"Sidney Gilchrist Thomas," the story of an invention and its consequences by Lilian Gilchrist Thomas. Published May, 1940, by Faber and Faber, Ltd., London. 328 pages; 10 illustrations. Price 12s. 6d net.

Andrew Carnegie once said of Sidney Gilchrist Thomas, "I never met a man who so carried me away, or who so completely separated in himself talent from that indescribable thing we call genius."

Thomas was only 36 when he died in 1885. Seven years before, while he was a minor clerk in a London police court, he had solved the problem of utilizing the phosphoric iron ores of England and the Continent, which before that time were thought to have little value. Today, fully 90 per cent of all steel made in the world is produced by the basic process which Thomas developed in collaboration with his cousin, Percy Gilchrist.

His biography, written by his sister who is now 81 years old, is as much of an autobiography as a biography. Almost the whole story of Thomas' life is told by means of his letters to his sister, to his cousins and others.

The book is a good deal more than an account of the developments leading to a major invention. It is the story of a man who although a brilliant scientist was also a keen observer and witty commentator on what went on around him in other than scientific fields. In particular, his accounts of two trips to America, and of a round-the-world voyage, would do credit to any reporter or professional travel writer.

—By J. M.

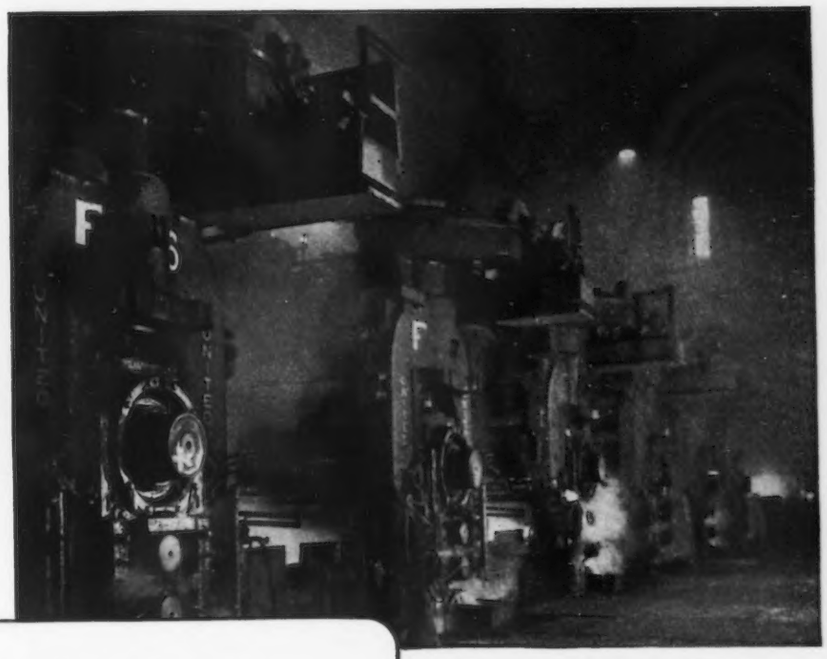
Rockford Plant Has Expanded Six Times

Rockford

• • • **Doubling its floor space,** Continental Dynamo & Motor Co. has started construction of an addition to its plant to handle manufacture of generators. Organized only two years ago, this firm has expanded its force six times.

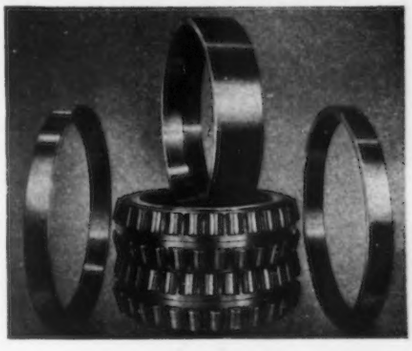
Record run

(*Above*) On the work rolls of this cold strip mill, Bantam Straight Roller Bearings (13" I.D., 17¼" O.D., 10" long) are used.



(*Above*) Both work rolls, and back-up rolls of this continuous hot strip mill use Bantam 4-row Tapered Roller Bearings.

NEW TONNAGE PEAK SET WITH BANTAM-BEARING-EQUIPPED ROLLS



(*Right*) A single large 4-row tapered roller bearing designed by Bantam for heavy duty mill service. Bantam has made many of the largest bearings ever built.

ALL-TIME tonnage high for an 8-hour run on a continuous cold strip mill was the record recently established at the plant of one of the country's leading steel producers. And the work rolls of the mills on which this record run was made are equipped with Bantam Bearings.

This is but one of the places in this modern plant where Bantam Bearings are helping to set new standards of steel mill performance. On the continuous hot strip mill are 4-row Tapered Roller Bearings also designed and built by Bantam. Bearings with a 35½" O. D. and 18" long are used on the back-up rolls of this mill. Work rolls are also equipped with Bantam Bearings of the same type, measuring 13" I.D., 17¼" O.D., 10" long.

These bearings are a typical illustration of Bantam's ability to meet unusual requirements with anti-friction bearings

Straight roller, tapered roller, or ball bearings—Bantam makes them all—is ready to supply the size and type needed for any service requirement. And the comprehensiveness of Bantam's line of bearings gives added value to Bantam's engineering counsel. With a background of years of experience in the design, manufacture, and application of every bearing type, Bantam engineers give unbiased, authoritative advice on bearing selection. For bearings that will give long, low-maintenance service under the severest conditions—TURN TO BANTAM.

BANTAM BEARINGS CORPORATION • SOUTH BEND, INDIANA

BANTAM BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

$40,000,000 to Be Spent for Heavy Forging Facilities in U. S. Plants

Washington

• • • **Expansion of heavy** forging facilities in about one dozen private plants and installation of forging facilities for shafting at the naval ordnance plant at South Charleston, W. Va., is provided for in a $40,000,000 program announced last week by Edward R. Stettinius, Jr., in charge of the Industrial Materials Division of the National Defense Advisory Commission. The Navy Department also proposes to acquire a 14,000-ton press and intensifier and several small presses which it will lease to some of the steel companies so as to increase its forging capacity.

In some cases, Mr. Stettinius said, the government is planning to advance the capital necessary for the additional facilities and in others, the individual companies contemplate furnishing their own capital under the standard form of government contract.

"Definite plans have been formulated in conjunction with representatives of the Army and Navy for expanding the country's existing heavy forging facilities to the point where they will be adequate to fulfill all requirements of the Army, Navy and Maritime Commission," Mr. Stettinius stated.

Mr. Stettinius declared that the national defense program required huge amounts of heavy forgings of various types used in the construction of battleships, cruisers, airplane carriers, destroyers, submarines, tankers and freighters, as well as for large naval guns, heavy artillery, projectiles and shells. Other products to be made include ship shafting, rudder stock, turbine rotors, turret paths, and air flasks for torpedoes.

An extensive study of the available supply of heavy forgings in relation to the needs of industry and of the Army, Navy and Maritime Commission has been made by the Navy Department and the defense commission with the full cooperation of the manufacturers of these products. The problem was to ascertain the location and capacity of existing facilities.

6 Companies Get Ordnance Contracts

Washington

• • • **The Army Ordnance Department has awarded contracts aggregating $22,588,607 for artillery matériel to six companies as follows: General Electric Co., Erie, Pa., $1,759,826; York Safe & Lock Co., York, Pa., $2,914,720; National Pneumatic Co., Rahway, N. J., $5,763,753; The Midvale Co., Nicetown, Pa., $1,260,308; Wheland Co., Chattanooga, Tenn., $1,500,000, and Mesta Machine Co., Pittsburgh, $8,390,000.**

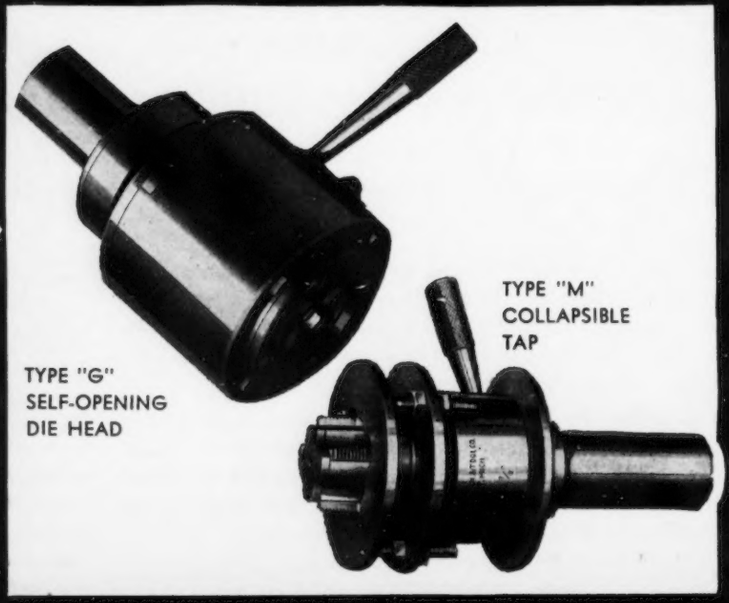
ORDNANCE WORK MEANS SCREW THREADS! . . . AND

Here are the Tools for it

Of course, ordnance work will call for screw threads—internal and external.

Whatever problems arise in ordnance production, you will have no problem at all in screw thread production if you use Murchey Collapsible Taps and Self-Opening Die Heads.

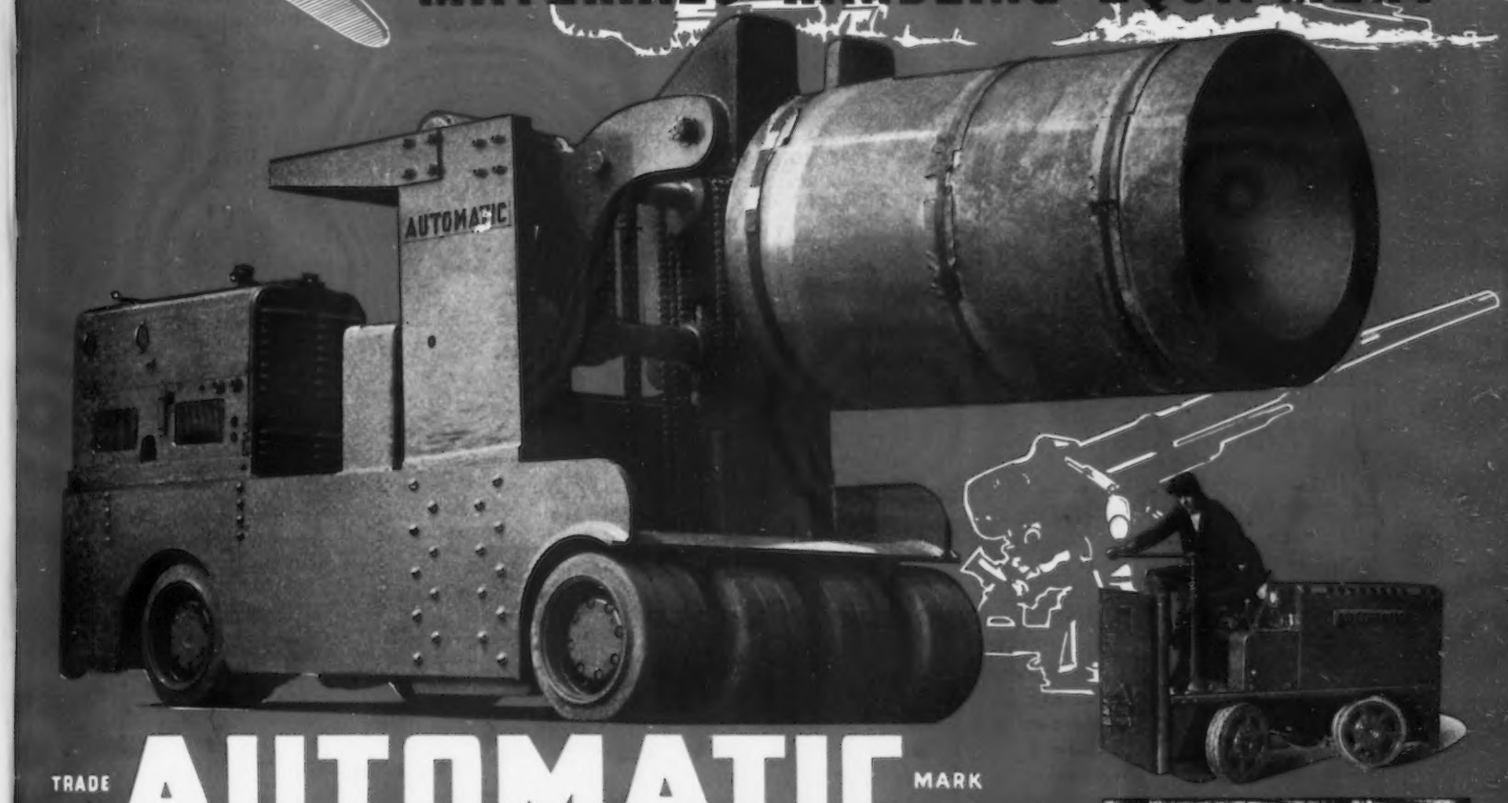
These tools—by design and experience—will produce accurate threads on long or short runs.



Murchey for all types of Collapsible taps, self-opening die heads, bolt and pipe threading machines, and chaser grinders.

THE Murchey MACHINE & TOOL CO.
951 PORTER ST. DETROIT, MICH.

Prepare for **NATIONAL DEFENSE PRODUCTION WITH ADEQUATE AND EFFICIENT MATERIALS HANDLING EQUIPMENT**

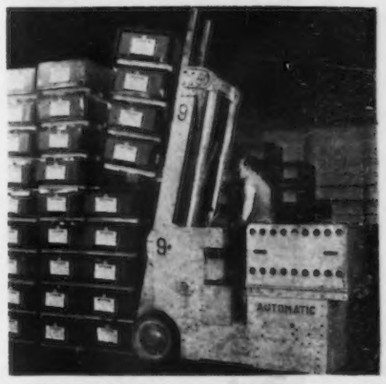


TRADE **AUTOMATIC** MARK

Whether you have already been called upon or expect to be asked to play your part in the National Defense Program it's TIMELY to check up on your materials handling system and equipment as many others have already done. It is highly important that you make sure you will have *adequate* and *efficient* equipment to *carry thru* without any bottlenecks or loss of valuable production time and skilled labor.

To get this *quick action* on Material Handling Problems get the valuable experienced aid now of the "AUTOMATIC" representative nearest you — let him show you the features of construction that today make "AUTOMATIC" "Electric Propelled" Material Handling Equipment the low-cost way for transporting, handling, stacking, piling, lifting — whether packaged goods, raw material, or bulk —see how "AUTOMATIC" offers you the greatest opportunity for speed, efficiency, and safety— learn why "AUTOMATIC" is today's economical answer to those thousand and one material handling jobs.

If it is necessary to replace your old equipment or add to your system "AUTOMATIC" has the *only* complete line of "Electric Propelled" equipment from which to recommend the type and capacity best suited to your needs. Then, too! Each "AUTOMATIC" is designed and perfected for its specific job with the latest engineering production tools to do your job reliably at lowest cost. Whether it's travel—lift or maneuvering you will have the satisfaction of knowing every movement is being performed with precision, efficiency, and utmost speed with safety. You'll know that with "AUTOMATICS" on the job your materials handling will be accomplished expertly and economically as can only be done with "Electric Propelled" equipment.



Some of the heavy duty types of the "AUTOMATIC" line are illustrated here. They represent but a part of the many "AUTOMATICS" now serving American Industry behind the scenes for the National Defense Program.

Remember *now* is the time to make your check-up without obligation, so write, phone or wire for an "AUTOMATIC" representative to discuss your materials handling problems.

AUTOMATIC TRANSPORTATION COMPANY

Div. of the Yale & Towne Mfg. Co.

75 W. 87th Street **Chicago, Illinois**

Be Sure to See *"AUTOMATIC'S" large display at the 1940 Iron & Steel Exposition, Sept. 24th to 27th, Stevens Hotel, Chicago, Booths 120-121-122-123*

WHEN YOU BUY TRUCKS · · *Buy* "AUTOMATIC"

I USE 3,000 A DAY

I USE 300 A DAY

We Both Profit by Insisting On PARKER-KALON Cold-forged Products

BECAUSE Parker-Kalon *Cold-forged* Socket Screws, Wing Nuts, Cap Nuts and Thumb Screws are made to such exacting standards, both small users and large enjoy the benefits that come with accuracy, strength, good design and fine finish. No wonder, then, that so many thousands have standardized on Parker-Kalon. Samples and prices are yours for the asking. Write.

PARKER-KALON CORPORATION
200-202 Varick Street New York, N.Y.

PARKER-KALON
Cold-forged
SOCKET SCREWS WING NUTS
CAP NUTS THUMB SCREWS
SOLD ONLY THROUGH REPUTABLE DISTRIBUTORS

Army to Standardize Planes, Urges Producers to Buy Tools, Materials

Washington

• • • **Authorizing them to** go forward with procurement of the necessary jigs, dies, tools, fixtures, material and equipment for its aircraft program, the War Department has sent speed up letters to 21 manufacturers of airplanes, engines and propellers and blades. The letters were sent out with the approval of the National Defense Advisory Commission and will enable the manufacturers to proceed without delay while the unsettled details of formal contracts are being completed. To expedite output the War Department program provides for type standardization to insure mass production of aircraft. The planes will be practical duplicates of models already being made for the Army.

The letters were sent immediately after the President signed the $5,250,000 second supplemental defense appropriation bill on Tuesday of last week. The measure provides for 14,394 airplanes, 28,282 engines and propellers and blades. The approximate costs of the airplanes and engines are $817,000,000 and $377,000,000 respectively. The estimated cost of the propellers and blades is $57,000,000.

Letters were sent to the following:

Airplanes: Boeing Aircraft Co., Seattle; Consolidated Aircraft Corp., San Diego, Cal.; Glenn L. Martin Co., Baltimore; North American Aviation, Inc., Inglewood, Cal.; Douglas Aircraft Co., Inc., Santa Monica, Cal.; Lockheed Aircraft Corp., Burbank, Cal.; Bell Aircraft Corp., Buffalo; Curtiss Aeroplane Division, Curtiss-Wright Corp., Buffalo; St. Louis Airplane Division, Curtiss-Wright Corp., Robertson, Mo.; Republic Aviation Corp., Farmingdale, L. I., New York; Beech Aircraft Corp., Wichita, Kan.; Vultee Aircraft, Inc., Downey, Cal.; Fairchild Aircraft Division, Fairchild Engine & Airplane Corp., Hagerstown, Md.; Ryan Aeronautical Co., San Diego, Cal.; Stearman Aircraft Division, Boeing Airplane Co., Wichita, Kan.

Engines: Ford Motor Co., Dearborn, Mich.; Continental Motors Corp., Muskegon, Mich.; Lycoming Division, Aviation Mfg. Corp., Williamsport, Pa.; Allison Engineering Co., Division of General Motors Corp., Indianapolis; Wright Aeronautical Corp., Paterson, N. J.

Propellers and blades: Propeller Division, Curtiss-Wright Corp., Clifton, N. J.

Because the planes to be manufactured will be similar to those already being produced for the Army it was stated that a majority of those in the new program can be obtained merely by exercising options in existing contracts.

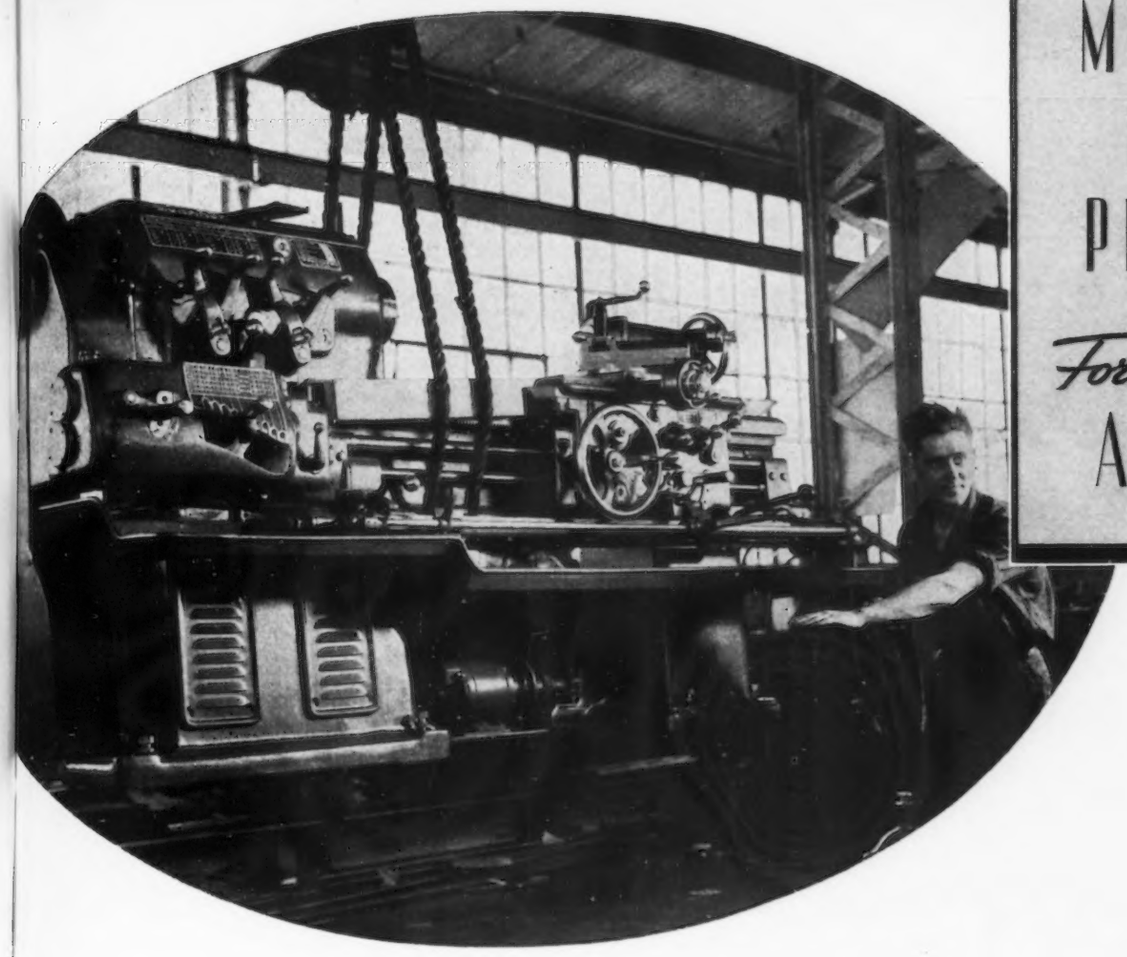
A War Department official said that by purchasing from plants that already are engaged in production for it, the Army obtains distinct advantages: (1) a saving of 60 to 90 days in advertising for and opening bids; (2) tests of new models will be unnecessary; (3) use of same plants, tools and experienced personnel in plants now producing Army aircraft; (4) mass production can proceed with assurance of large orders and standard types without interruption of production line by new models.

Bethlehem Will Use Columbia Steel Plant

• • • The Navy Department has announced that as a step in facilitating the shipbuilding program it has arranged to purchase from the Columbia Steel Co., United States Steel Corp., subsidiary, at a cost of $1,900,000, the company's Risden plant in San Francisco.

Following the execution of a formal purchase agreement and the removal of stocks belonging to the company, the property will be turned over to the Navy Department. The department said that warehouses and land will be converted for shipbuilding facilities for use by the adjacent Union Iron Works of Bethlehem Steel Co.

The Bethlehem Company was awarded contracts for 18 destroyers and four cruisers on Sept. 9.



MONARCH'S 8-POINT PLATFORM *for Forward Looking* AMERICA

POINT 3 OF MONARCH'S PLATFORM

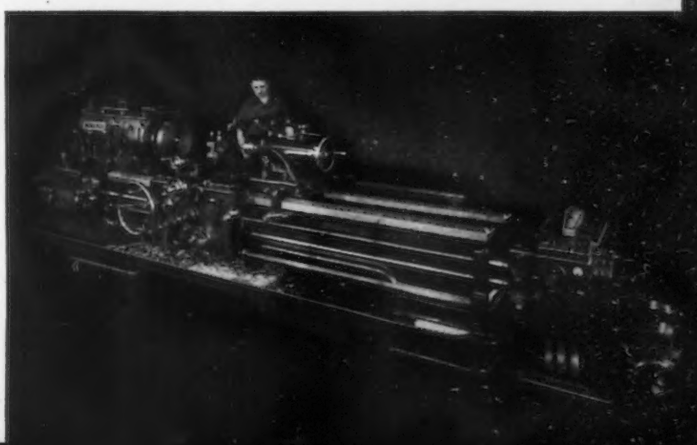
* * * INDUSTRY SHOULD BEWARE OF OBSOLESCENCE

INDUSTRY has developed in exact proportion to the improvement and modernization of its productive machinery.

To delay modernization is to pay a premium on production—to permit your competitor to make more profit than you do—to put yourself in a position where, when you are compelled to modernize, it becomes a major and most costly effort.

Monarch, through constant research, anticipates the needs of tomorrow's production. Monarch, as always, pioneers with many of the most advanced developments in lathe manufacture. When your requirements outgrow your manufacturing facilities, you can turn with confidence to Monarch for the latest in turning equipment. The Monarch Machine Tool Co., Sidney, Ohio.

A 20" Monarch Lathe made "Automatic" with Monarch's "Automatic Sizing" controls. Does more to increase production and reduce cost than any lathe improvement ever made.



MONARCH LATHES

Machine Tool Industry at Peak, New England Survey Shows

By FRANK J. OLIVER
Machine Tool Editor, The Iron Age

• • • So many variables must be taken into account in solving the terrific production problem facing the machine tool industry today that it has been impossible to adopt any industry-wide policy or even for any single machine tool builder to go ahead on anything more than what amounts to a day-to-day policy making basis. Yet there is no doubt on the part of the industry that it will successfully handle the manifold problems raised by the needs of the defense program for metal working machinery. Summarized in this article are some general impressions gained by the author after a week of visits to machine tool companies in the New England area. This section as a whole has the greatest concentration of the machine tool industry, although no one city can come up to Cincinnati or perhaps Rockford in point of numbers. It gives a fair cross-section of the products of the industry, excepting the manufacturing of some of the larger equipment like planers and planer type millers, made in the Middle West.

Expansion of manufacturing facilities probably began earlier among the New England companies and has reached a higher point of saturation than elsewhere, a check of building reports during the past year reveals. Many companies have added to their floor space to provide needed room for new lines of equipment, and most companies have taken advantage of the present high demand to replace as much obsolete equipment as possible, but in the main it is felt that the limit of prudent investment of further capital funds has long since been passed. Any further extension of production facilities will be strictly for patriotic purposes—to aid the defense program—and most machine tool builders would rather not contemplate what the market prospects might be after the world settles down to the pursuits of peace.

As things stand now, the full impact of the defense program has yet to be felt by many companies, busy as they are. Large quantities of millers and profilers have been sold to the Springfield Arsenal for gun work, it is true, and some of these set-ups are being duplicated by outside gunmakers who have government contracts. Some sensitive drilling machinery is now being called for by several contractors on fuse work on larger shells, but orders for automatic screw machines for producing the projectiles themselves, particularly in the smaller sizes, say 37 mm.,

FRUEHAUF FOTO

Down comes the brake on these ARMCO ZINCGRIP-PAINTGRIP sheets. There is no cracking, no flaking, no peeling of the galvanized metal. And out come sturdy roof panels for streamlined truck trailers.

Next the bonderized surface of ARMCO ZINCGRIP-PAINTGRIP comes into play. This special mill finish permits immediate painting in any color. Shop costs go down and stay down. No need for etching; no loss of the protective zinc coating.

Once out of the shop, tops and bodies made of ARMCO ZINCGRIP-PAINTGRIP ring the bell to easier trailer sales and more satisfied customers. Protected by the tightly adherent ZINCGRIP coating, these roof panels really take the weather. Seams resist rust inside and out. Paint jobs look better, last longer.

Maybe your products and your sales will thrive on ARMCO ZINCGRIP-PAINTGRIP sheets. Why not talk it over with an experienced ARMCO man? Just write The American Rolling Mill Co., 2530 Curtis Street, Middletown, Ohio.

ARMCO ZINCGRIP-PAINTGRIP Sheets

are just beginning to come through. The demand for shell turning lathes for larger caliber shells—the 75s—is nil so far. The demand from the U. S. Navy for ordinary engine lathes has been fairly steady, but these machines are being used more for repair work than for new production. Some engine lathe manufacturers are still selling the greater part of their output abroad.

On the other hand, many New England builders of such machinery as internal and external grinders, milling machines and turret lathes, had begun to get busy two or three years ago when aircraft production was being expanded abroad. British and French aircraft engine builders were loading up these machinery plants with orders three years ago and it was then that such builders began to increase the number of shifts from one to two and then to three. A year ago saw the placement of huge aircraft orders in this country and the engine builders, particularly, began to construct so-called "French" and "British" plants. At the same time the then Allies began to increase their purchases of aircraft production equipment. By far the larger portion of the $80,000,000 worth of machine tools bought by the French in the early part of last winter was for producing aircraft engines, and this statement also applies to the British purchases of lesser amount. There was practically no call for direct munitions manufacturing equipment, for example. Now with plants fully equipped here to take care of foreign aircraft orders, our own government's recent large production orders for engines has necessitated machine tool buying largely from the same sources on an even larger scale.

The fact that two or three shifts were common over two years ago precludes the possibility of many machine tool builders from increasing output now, merely by adding shifts. Incidentally, practice in this regard is by no means universal. Some builders, in the smaller communities, where the labor market is more limited, are still working only one shift, with some part of the working force on a 12-hr. day. One firm is working two shifts right around the clock, with one or one-half hour lunch periods. Where three shifts are employed, the third one may have only a skeleton working force in

Man Marketing Clinic Formed at Milwaukee

Milwaukee

• • • The Milwaukee Man Marketing Clinic is a unique institution established at 411 E. Mason St., Milwaukee, by a group of men representing the city's industrial interests for the purpose of ascertaining whether better placement methods can help solve the present continued unemployment problem. The plan is being successfully worked in New York and Chicago.

AMCO'S part in the preparedness program
Ordered in last three months—21 AMCO PIT FURNACES... total heating capacity 2,500,000 tons
Gun Forging Furnaces
AMCO-designed Pulverized Coal Systems
Gun Annealing Furnaces
Rotary Hearth Furnaces
Continuous Rail Re-Heating Furnaces
In these times of heavy demands on Industry, AMCO'S experienced engineers can help speed production and lower cost with specially-designed Furnace Equipment to meet your individual requirements.
Continuous Bloom Heating Furnaces
The AMSLER-MORTON COMPANY
FULTON BUILDING • PITTSBURGH, PA.

"STANDING UP FINE AFTER ELEVEN MONTHS"

says

UNICHROME* RACK COATING-W

user

Another user of "Unichrome" Rack-Coating W* joins the enthusiastic boosters of this new, superior rack insulating material. He writes, "After 11 months use, your Unichrome Rack-Coating W* is still standing up fine, in both the bright nickel and chromium solutions."

Plating shops and manufacturers alike are outspoken in their approval of this better rack insulating material developed by United Chromium. For, in "Unichrome" Rack-Coating W*, they have found a *combination* of advantages not available in any other rack insulating material:

1. Withstands boiling cleaners and all plating solutions.
2. Tough—withstands wear and tear of handling.
3. Contains no ingredients harmful to plating solutions.
4. Cuts costs—reduces frequency of recoatings.
5. Easy to apply—"dip and force dry" method.
6. Light in color—easy to see how well the rack is covered.
7. Any part of rack can be recoated without recoating entire rack.

Write for Bulletin 15 Containing Complete Information—

Platers without rack coating facilities may have their racks coated with "Unichrome" Rack-Coating W* by Chromium Corporation of America, 4645 West Chicago Avenue, Chicago, Ill.; Belke Manufacturing Company, 947 North Cicero Avenue, Chicago, Ill.; or Lea Manufacturing Co., Waterbury, Conn.

UNITED CHROMIUM INCORPORATED

51 East 42nd Street, New York, N. Y.
2751 E. Jefferson Ave., Detroit, Mich.
Waterbury, Conn.

*Trade Mark Reg. U.S. Pat. Off.

those departments where bottlenecks exist. Nearly every builder is paying a large percentage of overtime, with 50 to 55 hr. more often the work week. A 50-hr. week would carry 55 hours' pay, of course. Time and a half for overtime has long been the practice in the industry, even before the Wage and Hour Act became effective.

Expansion of the working force has been a problem with every builder. Except for a few well-known examples, formal apprenticeship training has not been in use since the depression and the smallness of size of many plants has precluded a formal set-up. Besides, apprenticeship training is not susceptible of speeding up in an emergency. Machine tool builders, like regular production shops, have been forced to adopt intensive operator training programs, usually in conjunction with the local trade school. Vocational high schools operating on the co-operative plan have been quite helpful in inducting young men into the industrial environment, and the 200 hr. intensive course now so widely used in Connecticut and other New England states has at least taken off the edges of the raw recruit for industry. Skilled operators have generally been called upon to carry on the further instruction necessary after a boy gets on the job. This procedure has reduced the productivity of some skilled workers by as much as 50 per cent for periods of several weeks, but most companies think the ultimate gain of another machine operator worth the temporary loss of efficiency. Some very useful workers have been discovered in this way.

The principal problem appears to be the discovery of aptitude, and while the 200-hr. school course is intended to weed out those unsuited for mechanical work, nevertheless the turnover of new help in some machine tool plants is very high, but this is not general for the industry. "There are still plenty of young men with a real mechanical bent upon which we can draw," one executive said.

In some companies making a type of machine where the tooling is an important feature, expansion of sales engineering departments has become necessary. One concern, which has quadrupled its number of proposal engineers in the last year, has drawn largely upon the service engineers and the demonstrators for men with the necessary familiarity of the equipment.

The machine tool industry has been one of its own best customers in the past year or so. Most of the machinery bought has been to replace obsolete machinery and thereby speed up output in the same floor space. One builder has replaced from 75 to 80 per cent of his old equipment. Replacement is greatly in excess of normal depreciation charges. Nearly every machine tool shop has increased its capacity on initial operations. Large size planers capable of supporting six to eight large size bed castings on the table have been newly installed in many plants. One builder has gone over almost exclusively to milling and has bought a planer type miller so large as to require an extension to the factory to house it. Those who still stick to planing indicate, however, that they are able to get much greater output than before by taking advantage of higher table traverse speeds and multiple heads. Other machines in wide demand by the industry itself have been horizontal and vertical turret lathes, and horizontal boring mills. All of this inter-industry buying has tended to increase the load on the industry at a time when outside demand was soaring. A large part of this equipment, however, is of a kind not in demand in aircraft engine plants nor on ordnance work.

The new machinery purchased has generally replaced existing machines and in many plants the

Arsenals Draw Men From Private Plants

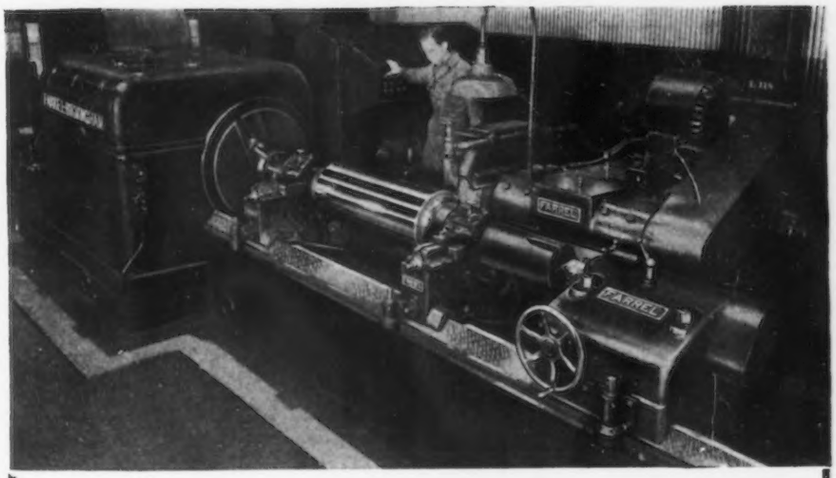
• • • Attractive wage rates paid under the United States Civil Service, vacations with pay and other benefits have made working at an arsenal or navy yard attractive enough to draw away workers from New England machine tool plants, already troubled by shortages of skilled help and faced with the problem of training raw recruits. Some intercity "swiping" of men is also reported.

added floor space has been used for assembly purposes and for running in. Probably because of the large amount of hand scraping and fitting required in machine tool manufacture, even though subassemblies may have been finished to surface plate flatness beforehand, the assembly department has proved to be the bottleneck—that and the run-in floor, where machines may literally be seen on top of one another. It is in these departments also where the labor shortage is most critical since, in direct contrast to mass production items, it is on the assembly line of a machine tool plant that the most skilled mechanics are to be found — or sought for.

Straight line assembly on a spotting basis is now quite common in the machine tool industry. One plant has five such lines. These lines do not move, except at long intervals, but to meet the output a certain number of machines do come off the line each day. In another plant, the bases are mounted on skids which engage a roller conveyor flush with the floor. Pushing from station to station is done by hand. Subassemblies feed the line and there are bins alongside holding hundreds of small parts. One machine tool builder has increased assembly space by leasing an industrial exhibits building at the local fair grounds not far from the plant.

Storage of parts in transit is another problem that is vexing manufacturers. This is particularly true of large bed castings awaiting machining. Executives at one big plant have already sacrificed their garage space for storage of such castings while a new addition is being built for this purpose.

One obvious way to increase output without unduly increasing the normal plant capacity is to job out work. Every New England machine tool builder has done this to some extent. Not only have regular job shops been given this overflow work, but builders of other machinery like printing presses and textile machinery have been doing parts work. Even some of the machine shops of the large textile manufacturers have taken on some of this work. Complete machines are being jobbed out also. Printing press manufacturers are particularly well fitted to



For Fast Production of High Precision Rolls

FARREL ROLL GRINDERS

The Farrel Heavy Duty Roll Grinder is both a production and a precision machine. It operates continuously at maximum speed . . . gives high output . . . grinds rolls of any material with extreme accuracy. It grinds perfect surfaces free from all marks . . . grinds straight, concave or convex contours of exact symmetry . . . applies the finest mirror finish or does heavy roughing equally well.

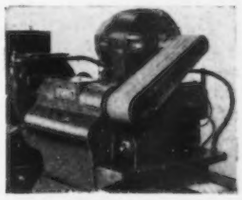
Automatic and semi-automatic features so minimize dependence on the operator's skill that there is no necessity for frequent stops to make adjustments or correct defects. With this machine is secured close control of accuracy and finish to meet predetermined standards.

Full Information at Booth 224
Iron and Steel Show

The construction and operation of Farrel Heavy Duty Roll Grinders will be explained in detail during the Iron and Steel Show by Farrel engineers stationed at Booth No. 224. They will also be glad to give you full information on Farrel Gears and Gear Units, Gearflex Couplings and the entire line of Farrel-Birmingham Machinery.

VISIT
FARREL BOOTH
No. 224
IRON & STEEL
EXPOSITION
CHICAGO
Sept. 24-27, 1940

Illustrated below are some of the features which contribute to the low-cost, high-output, high-accuracy performance of Farrel Heavy Duty Roll Grinders.



Heavy, Rigid, Smooth-Running Spindle

Automatic, Accurate, Symmetrical Roll Crowning and Concaving

Centralized, Finger-Tip Control

Compact, Self-Contained, Smooth-Running, V-Belt Roll Drive

FARREL

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

meet the precision standards of the machine tool industry and apparently have been doing a very satisfactory job. Work has been placed as far west as Chicago, principally on milling machines. One New England builder has jobbed out part of his line completely in order to concentrate on another, the demand for which has been far above normal.

As far as machining work goes, the situation is different in every plant. Milling of threads on lead screws may be the bottleneck of a lathe builder and planing work on big castings will be the department that runs all night in another plant. In a third, it may be grinding operations where the pinch comes. Builders are trying to overcome these hot spots by using extra shifts, by ordering more equipment (in which they face a delay of many months in getting delivery) and by improving their methods. One machine tool executive believes that output may be increased by as much as 25 per cent by revamping methods of production in his own shop without spending any more money for equipment. Others are paying more attention to wage incentive systems to help increase output. In fact, manufacturers are trying every available means to get out machines faster and to reduce mounting backlogs. One leader in the industry says his company produced more machines in August than they had possibly imagined they could do last January. "And this January, we will probably turn out many more machines than we believe possible now," he concluded.

One of the factors in any expansion program is financing. So far this has been done in a number of ways. New capital has been brought in by the sale of stock, surplus has been drawn upon and some machinery builders borrowed from banks or insurance companies. Profits will be good this year, but with the new tax bill not yet definitely formulated by Congress, reserves to be set aside for Federal taxes will necessarily be large, particularly since the bigger companies will be hit hard by the excess profits taxes. There is much confused thinking about the amortization feature of the proposed tax law, since one can judge the application of this feature to machine tool builders only by wading through the welter of testimony before the Senate Finance Committee. This testimony indicates that even the experts do not know exactly how the present House version will apply. Machine tool men in general favor the five-year write-off, but do not know whether the 20 per cent annual amortization charge can be handled like ordinary depreciation in figuring machine burden, whether the added charge can be tacked onto the price of the machine, and who will own the equipment at the end of five years. As far as the present high rate of activity is concerned, no one dares look more than two to three years ahead. Some would just as soon see the

DOUBLING IN BRASS
TO THE TUNE OF $200

● IN THE theater when you double in brass you do two jobs for the price of one. Wyandotte, working on a brass cleaning operation, recently saved a company the cost of more than *ten* cleaning jobs a month. Brass parts were cleaned, packed and shipped — no finishing operation.

By the old method of using an alkaline electro-cleaner on direct current with a 600-gallon tank, the work had to be racked, rinsed and dried in sawdust. . . . Cost of Alkaline Cleaner per month: $18.90.

With Wyandotte Solvent Detergent now on the job the work is placed in baskets and put in a non-conveyor-type spray washer (60-gallon capacity). After the work is rinsed it is dried with compressed air; racking and sawdust are eliminated and the cost for Wyandotte Solvent Detergent per month is only $1.54. . . . A saving of $17.36 per month, $208 per year! Your Wyandotte Representative will help you cut down *your* cleaning costs. Write today.

Wyandotte
SERVICE REPRESENTATIVES IN 88 CITIES
THE J·B·FORD SALES CO· WYANDOTTE MICH·

RAOUL E. DESVERNINE, above, president of Crucible Steel Co. of America, on Friday, Sept. 20, will address the final general session of the 18th annual conference of the National Industrial Advertisers Association at the Hotel Statler, Detroit.

government purchase the additional facilities outright and let the manufacturer operate it on a fixed-fee basis.

Another one of the immediate variable factors is the outcome of the present Battle of Britain. The British orders on the books of machine tool builders represent a goodly portion of the total load, particularly since the taking over of the French contracts. New orders are being placed. Others are coming in from the dominions. Many Canadian orders are coming in independently of the British Purchasing Commission in New York. Collapse of British resistance would have a tremendous repercussion on the domestic picture, but obviously no plans have been made for such a disastrous contingency.

Right now, the demand for most machine tools is so great that many would like to see a let-up. All new defense programs so far have been based on entirely new machine tool set-ups. The huge reservoir of existing equipment has practically been left untouched. Some of it of course is obsolete, too high a percentage in fact; some of it is highly special purpose in character, like an automotive cylinder block manufacturing line, and some of it, like rifling machinery, has no commercial parallel application. On the other hand, it is believed that a great deal of this existing machinery could be retooled for defense work at no greater effort than would be required to tool up new machinery. This will be one way of avoiding an excessive overexpansion of the machine tool industry, far beyond its normal peacetime demands. The industry cannot help looking forward to that inevitable day of reckoning when it will find itself with huge plants, only partially depreciated, and order books empty.

THROUGH THE YEARS KINNEAR STEEL ROLLING DOORS HAVE PROVED THEIR ABILITY TO *Withstand the Bombardment of Daily Service*

Steel is essential in any war. And in its continuous battle on "costs" Industry has long ago found the right weapon to fight "door costs." Kinnear Steel Rolling Doors! Built of steel these doors have strength and durability that practically "licks" the question of maintenance and replacement. Aside from their lasting qualities, they're fireproof, weatherproof and an effective barricade. Records show them to be withstanding, in many cases, the bombardment of 20, 30 and 40 years of daily service. And this is not all! Kinnear Doors are more efficient and convenient to operate. By coiling in a compact space above the opening they save space, are out-of-the-way when open and lend themselves ideally to motor operation. For maximum industrial preparedness install Kinnear Steel Rolling Doors NOW. They're built for any size opening in old or new buildings!

THE KINNEAR MANUFACTURING COMPANY
1760-80 FIELDS AVENUE COLUMBUS, OHIO
Offices and Agents in All Principal Cities
Factories: Columbus, Ohio and San Francisco, California

KINNEAR ROLLING DOORS

Grading Abrasive Sticks . . .

(Continued from page 51)

places on the specimen. One Rockwell E reading was taken at this spot and gave 78 compared to readings of 63 at other places on the standard. These differences indicate definite variations in the brass itself and not in the operation of the machine.

In manufacturing a bonded abrasive product, the first operation is to select abrasive grains of the specified kind and size (the size designations for fine grits used by different abrasive manufacturers differ somewhat, but steps are being taken to secure greater standardization of size designation). A definite amount of grains is mixed with a definite amount of a powdered bond, and the whole is thoroughly agitated together in various ways and for various lengths of time in order to produce as homogeneous a mixture as possible. The desired product is molded from this mixture (again taking all possible care to obtain uniformity), dried, and finally heated or fired in a kiln.

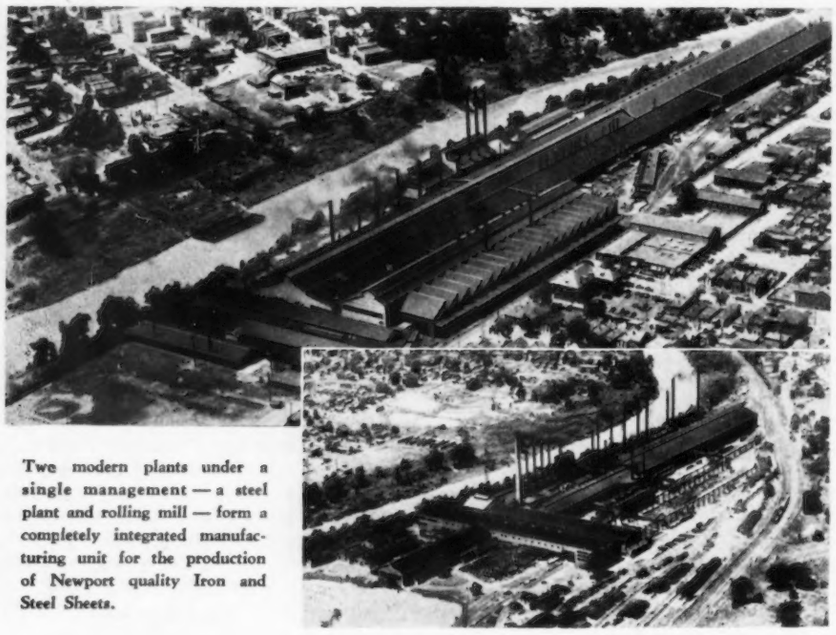
Careful supervision in making the product amounts to a control of its grade through manufacture. Various grading test methods are used to examine the final product to determine whether or not it is "to grade." These tests may include examination of the homogeneity and other characteristics of its physical makeup, as well as various mechanical tests which measure its strength in tension as well as in compression.

A perfect to-grade product is one that is made of the correct raw materials and is homogeneous and uniform down to the scale of size set by the abrasive grains and by the bond post; is one that has the right volume relationship between grains and bond, and that has the bond matured to the proper strength with proper adherence to the abrasive grains. All the various tests made to check the grading of a product may be considered to be examinations designed to tell whether these requirements are met within a satisfactory commercial tolerance.

Obviously the primary requirement in setting tolerances for the grade of an abrasive article is the tolerance requirement based upon satisfactory grinding action for the customer on his operation.

Honing, superfinishing, lapping, and other similar operations require close grade control, and abrasive manufacturers aim to hold their products so as to be satisfactory for the customer's operations. However, unnecessarily close specifications with respect to a test such as Rockwell hardness might mean excessive manufacturing costs and rejections, and might have to show up eventually as an increased price for the product.

To sum up, the Rockwell method as proposed by Mr. Hemingway appears to have value for checking the bonding strength of fine vitrified abrasive products of relatively soft grade, when carefully used within the limits mentioned above.



Two modern plants under a single management — a steel plant and rolling mill — form a completely integrated manufacturing unit for the production of Newport quality Iron and Steel Sheets.

Your search for Quality Iron and Steel Sheets ends here at NEWPORT

Hot Rolled Sheets • Newport Electrical Sheets • GOHI Pure Iron-Copper Alloy Sheets • Globe Brand Galvanized Steel Sheets, Roofing and Siding • GOHI Enameling Iron Sheets • KCB Copper Steel Sheets • Newport Long Terne Sheets • Newport Galvannealed Sheets • Newport De-Luxe Metal Sheets.

It is no small accomplishment to produce iron and steel sheets of fine quality in these days of strict metallurgical control and modern manufacturing processes. However, to maintain uniformly highest quality during almost half a century of service to critical buyers, is the achievement of Newport, where since 1891 there has been but one standard of excellence; with every sheet the best for the particular purpose for which it is intended.

Iron and Steel Sheets by Newport are available for all general industrial and commercial uses, in sizes, gauges, grades and finishes to your exact specifications. Entrust your requirements to Newport, and enjoy the many advantages that come to users of these superior sheets.

THE NEWPORT ROLLING MILL CO.
NEWPORT KENTUCKY
DIVISION OF THE ANDREWS STEEL CO.

ANDREWS PRODUCTS IN CARBON AND ALLOY STEEL: BARS • PLATES • UNIVERSAL MILL PLATES • SHEET BARS • BILLETS • BLOOMS • SLABS.

$1,500,000 Expansion For Federal Ship

• • • Federal Shipbuilding & Drydock Co., a U. S. Steel Sorp. subsidiary, is carrying out a plant expansion to cost from $1,500,000 to $2,000,000, including a $750,000 warehouse, a $200,000 pipe shop and reconditioning of shipways at a cost of $350,000. Additional machine shop facilities will be provided. The Kearny plant has new contracts to build five cruisers and 17 destroyers.

Manual on Sabotage For Defense Plants

Washington

• • • **Certain industrial** plants working on defense contracts have been given copies of the government's confidential book on protective measures against sabotage and espionage.

The manual, compiled by the Federal Bureau of Investigation, has been available heretofore only to federal agents, military and naval intelligence services and ranking police officers assigned to certain industrial establishments. Attorney General Robert H. Jackson emphasized at a press conference last week that the manual is still to be treated as confidential and is not being released generally to industry but only to those companies engaged in essential defense work.

The FBI has used the manual in a survey of more than 500 plants working on defense contracts.

Canada's 1939 Steel Imports Total $183,159,650

Ottawa

• • • **Production of iron** and steel and their manufactures in Canada for 1939 was valued at $550,222,550, according to preliminary figures by the Dominion Bureau of Statistics. This figure is 0.3 per cent over the total for 1938, which in turn was 12.2 per cent under the corresponding total for 1937.

Canada's imports of iron and steel products in 1939 advanced to $183,159,650 from $162,554,216 in 1938 and exports for the same period rose to $63,102,432 from $60,139,369 in 1938.

Lower Prices Announced For Kennametal

• • • **The McKenna Metals Co.,** Latrobe, Pa., announces new low prices on standard Kennametal steel-cutting tools and blanks in its price list No. 4. Savings up to 60 per cent are made on these standard tools and blanks, compared with the preceding list. The general small user can now buy Kennametal tools at prices comparable to high speed steel tools.

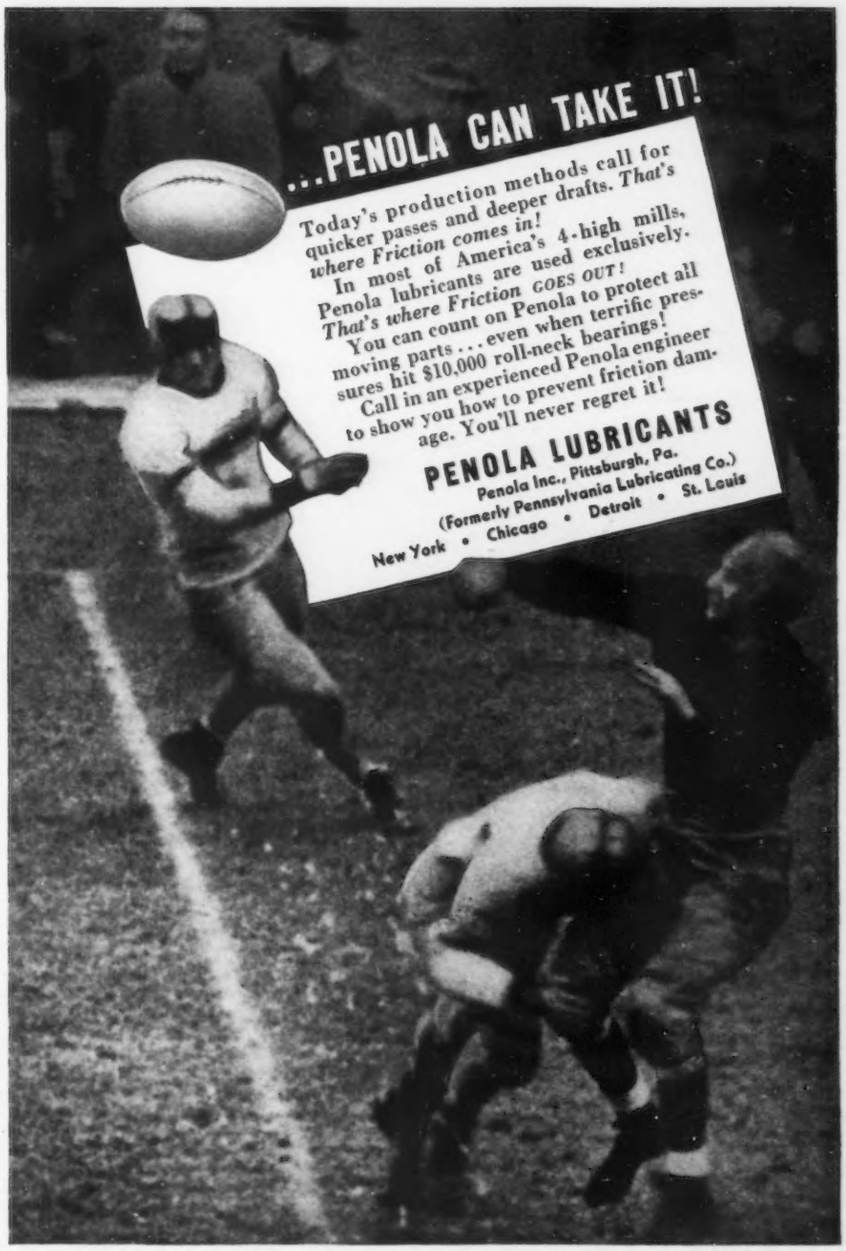
Defense Board Disowns Report on Bottlenecks

Washington

• • • **The National Defense** Advisory Commission had nothing to do, it is said here, with a report just prepared by Administration economists in which recommendations were made to prevent so-called bottlenecks in industry and to prevent increasing prices. The report is said to have originated in one of the old established Government departments. It has not been "officially" released.

The report is said to predict that steel production will rise to capacity by January, with shortages already appearing in some types of output such as armor plate. The machine tool industry needs 25 per cent more facilities, the report is said to state.

for HIGH-PRESSURE PASSES


...PENOLA CAN TAKE IT!
Today's production methods call for quicker passes and deeper drafts. That's where Friction comes in!
In most of America's 4-high mills, Penola lubricants are used exclusively. That's where Friction GOES OUT!
You can count on Penola to protect all moving parts . . . even when terrific pressures hit $10,000 roll-neck bearings!
Call in an experienced Penola engineer to show you how to prevent friction damage. You'll never regret it!
PENOLA LUBRICANTS
Penola Inc., Pittsburgh, Pa.
(Formerly Pennsylvania Lubricating Co.)
New York • Chicago • Detroit • St. Louis

LUBRICANTS FOR THE STEEL INDUSTRY SINCE 1885

Does your pickling plant—

- have a lag in the process?
- or does the Maintenance crew have trouble keeping your acid handling equipment up to par?
- or is down-time for repairs and replacements holding up production?
- or is it taking too long to unload tank cars of acid?

If you are having any such troubles, there's an easy out—*use equipment that can stand the gaff.*

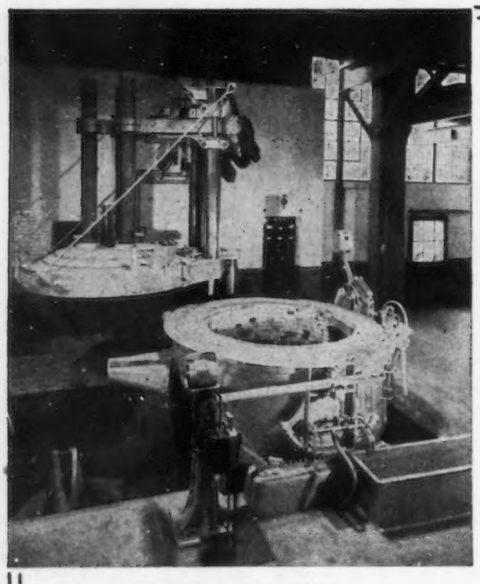
The Duriron Company makes corrosion-resisting equipment—pumps, valves, steam jets, heat exchangers, pipe and fittings and other engineered equipment—designed to overcome such difficulties, in alloys having the required physical and chemical characteristics.

It's just a matter of moments to drop us a line saying what you are up against. And it undoubtedly will be well worth the time to write.

●

THE DURIRON COMPANY, INC.

438 N. Findlay St. **Dayton, Ohio**



USE
MOORE RAPID
Lectromelt
FURNACES
for
MELTING
REFINING
SMELTING

Illustration shows top charge type LECTROMELT furnace with roof raised and rotated to one side to permit quick charging with drop bottom bucket.

LECTROMELT furnaces offer the rapid and economic means for the production of plain carbon and alloy steel ingots and castings as well as gray and malleable irons. Top charge and door charge types are both available. LECTROMELT furnaces are built in standard capacities from 25 pounds to 100 tons. Write for details.

PITTSBURGH LECTROMELT FURNACE CORP.
Foot 32nd St. **Pittsburgh, Pa.**

Expansion of Ordnance Projects Authorized

Washington

• • • **In addition to** speed-up letters previously issued by the War Department covering its $1,250,000,000 aviation program, the department issued 14 similar letters last Friday authorizing the recipients to do all things necessary for such increase in their production facilities as may be required for the following ordnance projects involving approximately $170,000,000:

General Motors Corp., Detroit, for the tooling of three machine gun plants on the following tentatively selected sites in buildings now owned by that company: Saginaw Gear Works, Saginaw, Mich.; A. C. Spark Plug Co., Flint, Mich.; Frigidaire, Dayton, Ohio.

The Western Cartridge Co., St. Louis, for the construction of a plant for small arms ammunition on a site to be selected.

The Remington Arms Co., Bridgeport, Conn.—for the construction of a plant for small arms ammunition on a site to be selected.

E. I. Du Pont de Nemours Co., Wilmington, Del.: addition to the smokeless powder plant, Charlestown, Ind.; TNT plant on site to be selected; ammonia plant on site to be selected; bag loading plant at Charlestown, Ind.; tetryl plant on site to be selected.

Atlas Powder Co., Wilmington, Del., for construction of TNT production facilities on site to be selected.

Humble Oil & Refining Co., Houston, Texas, for construction of a toluol plant on a site to be selected.

Allied Chemical & Dye Co., New York, for the construction of an ammonia plant on a site to be selected.

Hercules Powder Co., Wilmington, Del., for addition to smokeless powder plant at Radford, Va., contract for which was let on Aug. 16, 1940; and for a bag loading plant on a site to be selected.

Sanderson & Porter, New York, for the construction of an ammunition loading plant on site to be selected.

$62,448,000 Plane Engine Order Goes to Packard

Washington

• • • **After weeks** of negotiation, the War Department announced late last week that it had awarded a $62,448,000 contract to the Packard Motor Car Co., Detroit, for manufacture of Rolls-Royce aircraft engines.

Draft Act Covers Plants for Defense

Washington

• • • **President Roosevelt** on Monday signed the selective training and service bill which included a rewritten provision authorizing the government to take over essential plants under certain conditions.

Section 9 of the act, relating to the requisition of private plants for enforcing the acceptance of and compliance with government defense orders, stipulates that:

1. Compliance with orders for defense products placed by the President through the War or Navy Departments by a company equipped to supply such products is obligatory.

2. If a plant refuses to supply ordered material or give it precedence, the President through the War and Navy Departments is authorized to take immediate possession of and operate any essential plant.

3. The government is also authorized to take possession of such a plant if in supplying essential defense equipment the company involved charges more than a reasonable price, as determined by the War and Navy Departments.

4. Violation of these provisions is deemed to be a felony punishable upon conviction by not more than three years imprisonment and fine of not more than $50,000.

5. Compensation to be paid for any plant taken over by the government shall be "fair and just." (Any owner dissatisfied with the rental awarded could sue the government for the balance claimed.)

Westinghouse Orders Heaviest in its Record

Pittsburgh

• • • **August bookings** of $57,352,054 for Westinghouse Electric & Mfg. Co. represented the biggest month in the company's history, according to George H. Bucher, president. The company's previous record month was October 1917, when orders amounted to $50,000,000. Elimination of the emergency orders from the August report, which would leave more than $20,000,000, would still be comparable to the best peacetime month in the company's history. Orders for the first eight months of this year amounted to $226,513,813.

HILLSIDE
FLUORSPAR
85% AND OVER IN CALCIUM FLUORIDE
DOES NOT EXCEED 5% IN SILICA • FREE FROM SULPHIDES, LEAD AND ZINC
Steel Manufacturers Standard Specifications
Shipments from stock
Rail or River
HILLSIDE FLUOR SPAR MINES
38 SOUTH DEARBORN STREET
CHICAGO, ILL.
MINES IN ILLINOIS AND KENTUCKY

PERFORATED METALS
INDUSTRIAL and ORNAMENTAL
To produce the highest quality of perforated metal as used in the industrial arts and for ornamentation has been the ambition and persistent endeavor of this company. The highest quality best serves the user. We are here to serve you.
ANY METAL • ANY PERFORATION
The Harrington & King PERFORATING Co.
5657 FILLMORE STREET—CHICAGO, ILL.
New York Office, 114 Liberty Street

Weirton Disputes NLRB's Authority

Pittsburgh

• • • **Weirton Steel Co.** early this week filed exceptions (129 typewritten pages) to the proposed NLRB decision handed down by the board last July. In addition, the company filed an appendix devoted principally to exceptions to the conduct of the hearing by the trial examiner, Edward Grandison Smith.

The NLRB's proposed decision was issued almost 18 months after the conclusion of the Weirton hearing which began in August, 1937.

The board ordered the company to cease recognition of the independent organizations of Weirton Steel Co. employees as collective bargaining agencies, to cease and desist from alleged unfair labor practices, and to reinstate 17 employees with back pay.

As a preamble to the exceptions filed by the company, it makes general exceptions which in effect challenge the right of the board to hand down any decision in the Weirton case. Important exceptions made are as follows: Bias and prejudice of the board against the company; arbitrary, biased and unlawful conduct of the hearing; private and improper conversations and discussions with respect to the hearing between the board, its agents, representatives, and agents and representatives of the SWOC; issuance of the complaint and prosecution of the hearing by the NLRB in order to further the SWOC's organization efforts; abuse and perversion of the board's authority under the Wagner Act to defame and harass the company.

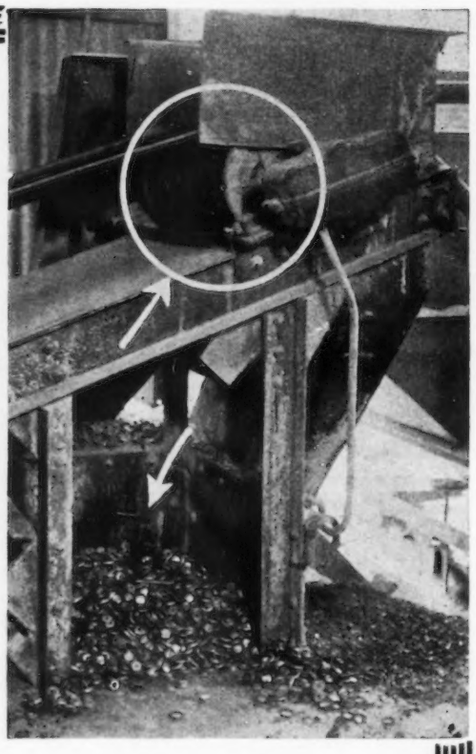
* * *

Buffalo

• • • **Settlement of** differences between officials of Bethlehem Steel Co. and workers affiliated with the CIO's Steel Workers' Organizing Committee at its Lackawanna, N. Y., plant were in progress early this week after action by the Department of Labor helped to avert a strike.

Nearly 3000 workers walked out Saturday, union leaders claimed, after placing of charges of discrimination against several men because of union affiliation. Company officials asserted the number of men away from their jobs did not exceed 50.

Another
IRON REMOVAL PROBLEM
Successfully Solved with a
Stearns MAGNETIC PULLEY



One of many jobs for Stearns Magnetic pulleys is picking bottle caps from cullet to prevent iron getting into glass batches of a large bottle maker.

Tramp iron is the prevalent nuisance of industry. Ruins machinery and property, contaminates your product. It may be in the form of nails, nuts, bolts, wire and such junk—it may be rust, oxide or other impurities.

For efficient, economical protection investigate the value of installing Stearns Magnetic pulleys, drums, suspended magnets, filters or other types of magnetic separators to suit your particular application. They will pay for themselves many times.

WRITE FOR BULLETIN 100

STEARNS MAGNETIC MANUFACTURING CO.
635 S. 8th St. Milwaukee, Wis.
SEPARATORS—CLUTCHES—PULLEYS—DRUMS—MAGNETS

New Airplane Contracts Total $116,842,227

Washington

The War Department has announced contracts for airplanes and spare parts aggregating $116,842,227 as follows:

Glenn L. Martin Co., Baltimore, bombers, $14,269,646; Boeing Airplane Co., Wichita, Kan., training planes, $6,934,096; Boeing Airplane Co., Seattle, bombers, $59,762,850; Lockheed Aircraft Corp., Burbank, Cal., pursuit planes, $15,646,450, and Douglas Airplane Co., Santa Monica, Cal., transport planes, $20,229,184.

Olds Strikes at Critics of Steel

Pittsburgh

• • • **There is no** "sit down strike of capital" and industry has not refused to cooperate with the government in its national defense program, Irvin S. Olds, new board chairman, U. S. Steel Corp., told more than 550 top flight executives and industrialists here this week when they gathered to meet him, Benjamin F. Fairless, U. S. Steel president, Enders M. Voorhees, chairman of the finance committee, and eight other directors of the corporation.

"Unfortunately, we have about us critics who appear only too willing by reason of ignorance or otherwise, to point a condemning finger toward business without attempting to ascertain the underlying facts," Mr. Olds said.

"I am positive," he said, "that this (steel) industry will not be found lacking in cooperation or in zeal or in patriotism, and it will acquit itself creditably and honorably in any test which may be assigned."

Mr. Olds said, "U. S. Steel to date has met without delay every requirement of the Government in the national defense program and the policy of U. S. Steel is to continue to cooperate fully and unqualifiedly in carrying to completion a program which should have the hearty support of all Americans."

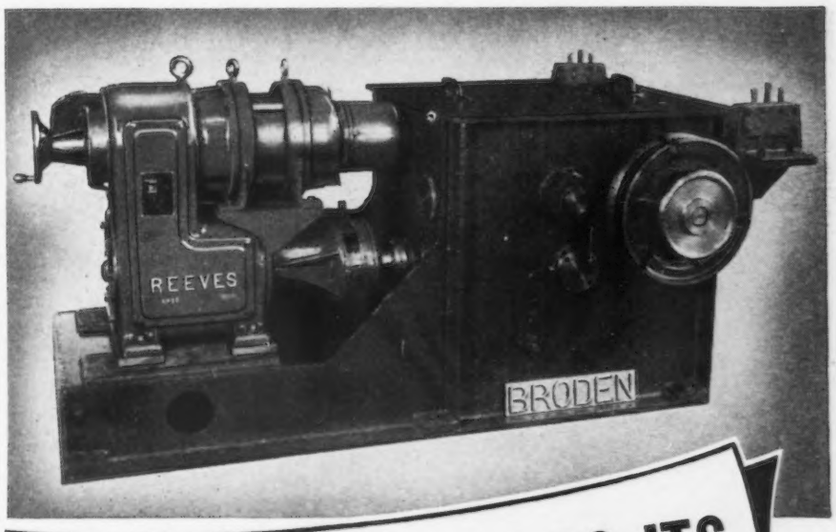
Mr. Olds warned, however, that in some instances months must elapse before deliveries in any quantity will be forthcoming under contracts which received wide publicity when they were placed. He added, "a particular article 'on order' may be many months away from utilization as a weapon of defense."

Emphasizing the details which must be cleared up before some defense orders reach completion, he said, "American industry must not be held responsible for delays in the commencement of the program or for the time necessarily required to carry out the program."

Mr. Olds emphasized that the quantity of steel sold directly to the government or to contractors known to have taken national defense contracts still accounts for only a small percentage of the present production of steel. Mr. Olds added, "I believe that the elasticity within the steel industry will permit an ample supply of steel when needed for the requirements of the army and navy, although some system of priorities may be found necessary. In the present emergency it is fortunate that the industry has not taken too seriously the charges of excess capacity made not so many months ago by certain critics."

Scrap Consumption at New High in August

• • • **Domestic consumption** of iron and steel scrap set a new high monthly record in August at 3,968,000 gross tons, according to the Institute of Scrap Iron and Steel, Inc., New York. Monthly statistics are not available prior to 1938, but in the record year of 1937, the monthly average was only 3,167,000 tons.



NO MACHINE CAN DO ITS BEST AT ONLY ONE SPEED

LIKE the welding wire coiling machine shown above, thousands of other production machines need variable speed control to meet changes in work schedules, different kinds and sizes of products, etc. If only one speed was available on this machine, some of the sizes of wire would be coiled too loosely, others too tight. In other instances, it is a matter of correct timing of operations of single machines, or synchronizing the operation of one machine with others; adjusting machine speed to changing conditions or materials; regulating speed to match the skill of operators, etc. REEVES Speed Control consists of a wide range of models and sizes to meet all installation requirements. Each REEVES unit is infinitely variable, accurate and positive within its rated range. Easily and inexpensively applied. Almost a hundred typical installations illustrated in 124-page Catalog G-397. Write for it.

REEVES PULLEY COMPANY, *Dept. I*, COLUMBUS, INDIANA

REEVES SPEED CONTROL

British Plants May Establish Manufacturing Branches in Canada

Toronto

• • • **New business in** Canadian iron and steel markets continues on an expanding scale and primary producers in this country are bending every effort to meet demands. New orders cover every line of steel production. Mills are carrying record backlogs with heavy booking on some materials carried well into the coming year and additional orders appearing in increasing volume daily. Supplementing Canada's record production, imports, especially from the United States, top all previous records.

Imports of iron and steel into Canada during July amounted to approximately $24,000,000, a gain of nearly 80 per cent over the $13,342,000 for July, 1939. The United States was the principal source of supply, the proportion in July having been 88 per cent. For the seven months ended with July, iron and steel imported into this country was valued at $153,903,000, of which the United States supplied $138,370,000 or 81.2 per cent. Principal items of imports were rolling mill products, farm implements, tractors and parts, automobiles and parts, and machinery.

C. D. Howe, Minister of Munitions and Supply, Ottawa, at a press conference stated that production of several classes of tanks, including one combining British and American design, will be started soon in Canada and some machines will be delivered next February. Some experimental, light, high speed tanks will be ready for testing within 60 days. For the production of these tanks, he stated, Canada's heavy industry has developed a new and highly satisfactory cast steel armor plate for tanks and also is producing rolled steel armor.

Mr. Howe stated that expenditures on plant and equipment account in Canada by the Dominion and British governments now total $220,000,000. The capital expenditures include $58,400,000 for explosive and chemical plants, $67,000,000 for armament, $19,000,000 for ammunition, $11,400,000 for shells, cartridge cases and fuse plants, $4,800,000 for automotive plant equipment, and $62,000,000 for base metal and aircraft.

Officials of Canadian Manufacturers Association announce that, in addition to the influx of new plants in Canada for the production of war equipment, chemicals and munitions, there is a movement underway for transfer of British industries to this country on a growing scale, to assure to customers of long-established British producers steady and continuous deliveries, no matter how intense Nazi bombing attacks on England become. A number of British companies have announced

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Has low thermal conductivity, and is most economical for efficient insulation.
Can be compacted without breaking and cuts easily.
Especially valuable for back up work behind fire brick walls.
Acts as expansion cushion between furnace walls and binding structure.

•

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Other Therm-O-flake Products
Made from Exfoliated Vermiculite
Granules - Brick - Block - Concrete

Illinois Clay Products Company
JOLIET, ILL.

intention of locating plants in Canada, while others have made arrangements with Canadian plants to supply their customers for the duration of the war.

Latest contract awards by the Department of Munitions and Supply, Ottawa, were valued at $7,862,000, of which approximately $2,225,000 were for construction projects, the remainder including 1368 orders were purchases on war account and included contracts to eight United States companies with value totalling $223,452.

Navy Readvertises for Its Steel Requirements

Washington

• • • **The Navy Department** has readvertised for its semi-annual steel requirements and will open bids for 103,796 tons after withdrawing a previous schedule calling for 117,638 tons which was to have been opened on Sept. 26. On Sept. 20 bids will be opened for 103,529½ tons and on Sept. 23 for 267 tons of special J & L sections. The earlier opening calls for 70,812 tons of plates, 18,892 tons of shapes, 5737 tons of sheets and 7088½ tons of bars and strips, broken down as follows: Plates: Medium black, 42,737½; medium galvanized, 9282½; high tensile black, 14,685; high tensile galvanized, 4107. Shapes: Medium black, 10,366; medium galvanized, 3434½; high tensile black, 676; high tensile galvanized, 225½ and 4190 tons of medium and galvanized special I-beams, stanchions, joists and tees. Bars and strips: Black, 5312½; galvanized, 1776. Contracts for the material will expire March 31, 1941.

New Follansbee Mills To Operate in November

Pittsburgh

• • • **Follansbee Steel Corp.**'s two new cold reducing mills at its Follansbee, W. Va., plant should be ready for operation in November and installation of the temper pass mill and other auxiliary equipment should permit operation of the complete new facilities by the end of this year, according to W. T. Brownscombe, president.

Continental Steel Operates New Mill

Kokomo, Ind.

• • • **Continental** Steel Corp. has now in operation a new three high sheet rolling mill which was constructed by the Lewis Foundry & Machine Division of Blaw Knox Co., Pittsburgh. It is equipped with a motor screw down and automatic roller and catcher tables.

Standard Tin Plate 5-Week Strike Ends

Canonsburg, Pa.

• • • **More than 2000** employees of Standard Tin Plate Corp., subsidiary of Continental Can Co., returned to work early this week following a five week strike by the Amalgamated Association of Iron, Steel and Tin Workers. The closed shop and check off were not conceded.

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Aviation Plant Building Program Costs $9,000,000

• • • **Republic Aviation Corp.,** Farmingdale, Long Island, is undertaking a building program costing $9,000,000, plus equipment, expanding its factory space by 1,000,000 sq. ft. to handle government orders for planes. Employment will be increased from 2350 at present at 10,000.

Eaton Mfg. Co. will add 52,900 sq. ft. of floor space at its Cleveland and Saginaw, Mich., plants. Electro-Motive Corp., subsidiary of General Motors Corp., has begun construction of a 240 x 280 ft. one-floor addition to its plant at La Grange, Ill., the fourth addition to the plant since 1935.

War Department Contracts To Sept. 7 Total $804,041,212

Washington

• • • **Contracts awarded** by the various supply arms and services of the War Department under the 1941 appropriations up to and including Sept. 7 aggregated $804,041,212. Leading was the Ordnance Department with awards of $397,308,214, followed by the Air Corps with $179,502,069.

Lavine Gear Expands To Build 5200 Trailers

Milwaukee

• • • **Lavine Gear Co.,** which will start production about Oct. 1 on a contract for 5200 trailers for the army, is building a shipping room 61 x 150 ft. The trailers originally were designed to carry 75 mm. shells but the army in its recent maneuvers found them useful for hauling men, kitchen equipment and baggage.

Manitowoc Shipbuilding Plans to Expand Yards

Manitowoc, Wis.

Following the award of contracts for 10 submarines at a cost of $6,000,000 each, Manitowoc Shipbuilding Co. is making plans for expansion. It is understood that facilities at the shipyards, plate shop and office bulding will be enlarged.

Government Awards

• • • **Government purchases** reported for the week ended Sept. 7 by the Labor Department's division of public contracts totaled $19,215,729 as compared with $29,354,035 in the preceding week. Details on orders above $15,000 follow:

Iron and Steel Products

Crown Can Co., Philadelphia, tin cans, $20,628.
The Yale & Towne Mfg. Co., Stamford, Conn., locks, $24,901.
Wheeling Corrugating Co., Wheeling, W. Va., iron buckets, $22,616.
Tredegar Co., Richmond, Va., practice projectiles, $19,228.
Russakov Can Co., Chicago, practice bombs, $117,300.
Bridgeport Thermostat Co., Inc., Bridgeport, Conn., practice bombs, $188,167.
The Tredegar Co., Richmond, Va., practice projectiles, $99,855.
Wackman Welded Ware Co., St. Louis, Mo., liquid drums, $55,064.
Crucible Steel Co. of America, Seattle, steel, $59,736.
The Timken Roller Bearing Co., Canton, Ohio, bar steel, $18,730.
Corbin Cabinet Lock Co., locks, $38,578.
C. Hager & Sons Hinge Mfg. Co., St. Louis, hinges, $36,137.
Jones & Laughlin Steel Corp., Pittsburgh, steel, $21,834.
The Timken Roller Bearing Co. Steel & Tube Div., Canton, Ohio, steel, $18,280.
Wheeling Corrugating Co., Wheeling, W. Va., stovepipe hoods, $30,158.
Walworth Co., New York City, valves and cocks, $21,116.
Joseph T. Ryerson & Son, Inc., Chicago, steel angles, $15,105.
Pennsylvania Forge Corp., Philadelphia, steel forging, $88,730.
Struthers-Wells-Titusville Corp., steel forgings, $87,520.
Crane Co., Washington, D. C., gate valves, $32,768.
United States Steel Export Co., Washington, fencing material, $23,677.
United States Gauge Co., New York City, check valves, $15,300.
Reeves Steel & Mfg. Co., Dover, Ohio, garbage cans, $22,919.
Mount Vernon Bridge Co., Mount Vernon, Ohio, steel bridge, $240,630.

Non-Ferrous Metals and Alloys

Northwest Lead Co., San Francisco, pig lead, $43,520.
Bridgeport Brass Co., Bridgeport, Conn., cartridge cases, $1,187,860.
Waltham Watch Co., Walthan, Mass., fuse parts, $16,619.
Veit & Young, Philadelphia, ejecting stems, $15,845.
Stewart-Warner Corp., Chicago, Ill., time units, $222,625.
Federal Screw Works, Detroit, Mich., units, fuses, $32,622.
Bohn Aluminum & Brass Corp., Detroit, booster units, $123,625.
Scovill Mfg. Co., Waterbury, Conn., tubes, $50,919.
Federated Metals Div., American Smelting & Refining Co., San Francisco, pig lead, $70,800.
York Safe & Lock Co., York, Pa., fuse setters, $122,132.
Westclox, Div. of General Time Instruments Corp., LaSalle, Ill., fuse parts, $185,299.
Chase Brass & Copper Co., Inc., Waterbury, Conn., cartridge cases, $2,766,813.
Norris Stamping & Mfg. Co., Los Angeles, cartridge cases, $356,166.

Other Machinery

Silent Hoist Winch & Crane Co., Brooklyn, New York, cranes, tractor, $16,710.
Reed-Prentice Corp., Worcester, Mass., lathes, $15,220.
Landis Tool Co., Waynesboro, Pa., grinder, $18,500.
Henry Prentiss & Co., Inc., New York City, turret lathes, $35,133.
Brown & Sharpe Mfg. Co., Providence, R. I., milling machines, $25,866.
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, milling machines, $23,024.
F. J. Stokes Machine Co., Philadelphia, pelleting presses, $47,760.
Kearney & Trecker Corp., Milwaukee, milling machine, $21,900.
The Lapointe Machine Tool Co., Hudson, Mass., broaching equipment, $66,493.
Ex-Cell-O Corp., Detroit, diesel engines, $15,449.
Carrier Corp., New York City, refrigerating units, $31,277.
E. L. Essley Machinery Co., Chicago, Ill., lapping machines, $88,716.
The Phillips Pump & Tank Co., Cincinnati, tank, pump, $16,820.
E. W. Bliss Co., Brooklyn, N. Y., punch presses, $22,330.
Gleason Works, Rochester, N. Y., cutting machine, $20,532.
The Warner & Swasey Co., Cleveland, turret lathes, $45,945.
Lloyd & Arms, Inc., Philadelphia, honing machine, $16,273.
Vickers, Inc., Waterbury Tool Division Waterbury, Conn., hydraulic pumps, $39,193.
Lloyd & Arms, Inc., Philadelphia, vertical presses, $15,130.
Mesta Machine Co., Pittsburgh, Pa., planer, $135,000.
Henrici Laundry Machinery Co., Boston, Mass., washing machines, $17,675.
Kearney & Trecker Corp., Milwaukee, Wis., milling machines, $57,968.
Wilson-Weesner-Wilkinson Co., Knoxville, Tenn., tractors, $82,458.
American Hoist & Derrick Co., St. Paul, Minn., locomotive crane, $21,009.
Industrial Brownhoist Corp., George M. Meriwether, representative, Birmingham, Ala., locomotive crane, $24,700.
C. S. Johnson Co., Champaign, Ill., mixer plant, $90,920.
Pratt & Whitney Div. of Niles-Bement-Pond Co., Hartford, Conn., lathes, $19,710.

Contracts have been awarded by the Navy Bureau of Supplies and Accounts this date, as follows:

American Tool Works Co., Cincinnati, Ohio, drilling machines, $15,570.
Manning, Maxwell & Moore, Inc., Bridgeport, Conn., steel valves, $9,860.
Collyer Insulated Wire Co., Pawtucket, R. I., electric cable, $61,935.
Walworth Co., New York, pipe flanges, $19,433.
Anaconda Wire & Cable Co., New York, N. Y., electric cable, $62,520.
Phelps Dodge Copper Products Corp., New York, electric cable, $61,423.
National Electric Products Corp., Pittsburgh, Pa. (Economy, Pa.), electric cable, $62,068.
Kearney & Trecker Corp., Milwaukee, milling machines, $59,763.
Crane Co., Washington, D. C., pipe flanges, $5,157.
American Steel & Wire Co. of New Jersey, electric cable, $30,873.
Stanley G. Flagg & Co., Inc., Philadelphia, Pa., pipe flanges, $39,938.
Westinghouse Electric & Mfg. Co., Washington, D. C., (East Pittsburgh, Pa.) sets, welding, arc, $11,396.
Picker X-Ray Corp., New York, N. Y., X-Ray units, $14,615.
Axelson Mfg. Co., Los Angeles, engine lathes, $61,459.
Triumph Explosives, Inc., Elkton, Md., cartridges, aircraft engine starter, $75,430.
Collyer Insulated Wire Co., Pawtucket, R. I., electric cable, $156,240.
American Steel & Wire Co. of New Jersey, Washington, D. C., electric cable, $154,936.
Phelps Dodge Copper Products Corp., New York, electric cable, $154,890.
Anaconda Wire & Cable Co., New York., electric cable, $155,335.
General Cable Corp., Washington, D. C., electric cable, $153,875.
The Okonite Co., Passaic, N. J., electric cable, $155,344.
National Electric Products Corp., Pittsburgh, Pa. (Economy, Pa.) electric cable, $155,594.

President Places Buying Principles Before Congress

Washington

President Roosevelt laid before Congress last week certain general principles governing the handling of defense contracts by the National Defense Advisory Commission, whose members reported that "the essence" of the program is obtaining adequate supplies in the shortest possible time.

Briefly, the commission urged that undue geographic concentration of orders should be avoided, recommended the use of negotiated contracts only where competitive bidding will not suffice, and suggested that every effort be made to secure fair prices by consideration of the proper cost factors and other means.

Steel Exports in July Total 1,034,938 Gross Tons, Imports 3,542 Tons

IMPORTS					EXPORTS			
July		Seven Months Ended July			July		Seven Months Ended July	
1940	1939	1940	1939		1940	1939	1940	1939
1,067	6,189	6,842	22,043	Pig iron	70,790	6,021	201,726	33,954
981	5,858	17,426	38,335	Ferromanganese and spiegeleisen[1]	150	147	10,247	185
103	96	767	985	Ferrochromium and ferrosilicon[1]	*	*	*	*
25	30	215	162	Other ferroalloys[1]	2,552	135	8,409	812
....	107	609	978	Sponge iron	*	*	*	*
152	3,335	1,412	18,138	Scrap: iron, steel, tin plate	327,129	350,066	1,808,234	2,139,018
2,328	*15,615*	*27,271*	*80,641*	*Pig iron, ferroalloys and scrap*	*400,621*	*356,369*	*2,028,616*	*2,173,969*
....	20	440	229	Ingots, blooms, billets, sheet bars	273,862	9,672	893,982	58,836
*	....	....	....	Ingots, etc.: stainless, other alloy	4,772	8	22,989	6,616
*	....	....	....	Skelp	13,012	3,584	44,433	8,221
18	727	3,944	5,738	Wire rods	21,162	3,706	124,346	14,309
18	*747*	*4,384*	*5,967*	*Semi-finished steel*	*312,808*	*16,970*	*1,085,741*	*87,982*
13	243	102	1,276	Sheets, black iron and steel[2]	43,574	20,065	286,933	155,827
*	....	....	....	Sheets, galvanized iron and steel	14,588	9,949	103,260	66,134
*	....	....	....	Sheets, alloy steel	31	398	3,599	1,943
*	....	....	....	Sheets, stainless	87	119	1,069	552
2	1	9	20	Plates, plain and fabricated	35,362	14,721	263,391	147,077
*	....	....	....	Plates, alloy	176	312	1,525	999
*	....	....	....	Plates, stainless	29	11	265	51
26	1,426	1,752	13,860	Bars, merchant and reinforcing	50,399	14,792	333,289	86,706
....	88	194	401	Bars, iron[3]	1,324	62	9,684	373
*	....	....	....	Bars, alloy steel	1,727	432	15,832	7,826
*	....	....	....	Bars, stainless	19	19	548	212
27	206	844	842	Bars, hollow steel	*	*	*	*
11	3,874	612	15,829	Hoops, bands, strips, cotton ties	17,837	4,661	195,879	38,319
*	....	....	....	Hoops, bands, strip: alloy steel	77	27	577	228
*	....	....	....	Hoops, bands, strip: stainless	78	187	442	629
....	....	....	462	Piling, sheet	1,673	439	8,543	3,374
4	4,867	691	30,742	Structural shapes	24,527	10,078	131,222	51,747
....	....	16	5	Structural material, fabricated[4]	4,509	2,039	44,139	18,593
15	1	72	37	Tin plate, terne plate, taggers' tin	30,447	22,612	298,124	123,196
*	....	....	....	Tanks, steel	2,082	2,445	16,276	16,006
182	409	2,190	28,277	Pipe, welded iron and steel	11,517	3,591	65,178	25,419
*	....	....	....	Casing and oil line pipe	13,933	4,686	113,971	40,363
*	....	....	....	Boiler tubes	2,135	555	13,609	4,294
20	97	806	1,397	Wire, round iron and steel, telephone	13,457	4,044	84,541	29,572
41	141	467	1,196	Wire rope, strand, other products	1,292	405	6,921	2,759
42	1,694	86	11,870	Wire, barbed, woven products	4,086	4,916	23,423	27,179
256	238	1,613	3,006	Wire, flat, all other types	7,010	2,463	43,601	15,540
1	838	104	5,741	Nails, tacks and staples	972	525	4,356	3,038
3	3	127	66	Bolts, nuts, rivets, washers, etc.	2,192	630	10,108	4,625
531	271	1,416	4,498	Rails and track material	18,176	6,601	87,071	48,094
....	....	12	80	Die blocks or blanks, etc.	*	*	*	*
....	42	3	245	All other finished steel	2,314	889	11,655	4,307
1,174	*1,439*	*11,160*	*119,850*	*Rolled and finished steel*	*305,624*	*132,675*	*2,090,032*	*915,368*
....	14	419	401	Cast iron pipe and fittings	11,318	1,813	47,451	19,120
....	6	2	108	Malleable iron pipe fittings	737	346	3,176	2,147
22	30	398	878	Casting, forgings: iron and steel	3,072	1,743	18,867	9,561
*	....	....	....	Castings, forgings: alloy and stainless	242	483	3,445	2,246
*	....	....	....	Carwheels and axles	716	3,465	9,329	15,498
22	*50*	*819*	*1,427*	*Castings and forgings*	*16,085*	*7,650*	*82,268*	*48,572*
3,542	30,851	43,590	207,845	Total	1,034,938	513,664	5,286,657	3,225,891

[1] In imports the tonnage shown is the alloy content; the manganese, chromium and silicon content, as the case may be. [2] Imports include skelp and saw plate. [3] Import figures include iron slabs. [4] Imports include sashes and frames only.
*No separate figures.

• **John J. Watson,** of Weirton Steel Co., Weirton, W. Va., has retired after a period of service which began with the organization of the original company, the Phillips Sheet & Tinplate Co., Clarksburg, W. Va., in 1905. Mr. Watson was manager of sales for about 15 years.

• **G. J. Zimmerman** has been elected president of the Strong, Carlisle & Hammond Co., Cleveland machinery dealer, to fill the vacancy caused by the recent death of Tyler W. Carlisle. Mr. Zimmerman, for a long time a member of the company's machinery sales organization, has for some time been vice-president and sales manager. **J. J. Stephens** has been made vice-president and general manager of the company and in addition retains his former position as treasurer. **R. L. Keech** has been re-elected secretary.

• **Frank W. Robertson** has been appointed general manager in charge of the Ungerer leveler and machine tool divisions of the Edward W. Voss Co., Pittsburgh. He formerly was sales manager of the Ungerer leveler division. **Clyde DeVilling,** formerly of Universal Cyclops Steel Corp., has been placed in charge of heavy machine sales.

• **Earl I. Bement,** vice-president, Methods Engineering Council, Pittsburgh, has been elected president of the Pittsburgh chapter of the Society for the Advancement of Management. **Charles T. Thum,** Owens-Illinois Can Co., McKees Rocks, Pa., has been elected vice-president and **W. A. Glanz,** Aluminum Co. of America, has been made secretary-treasurer.

• **E. C. Herrington,** for five years chief engineer for Herrington & Randall, Inc., Detroit, has joined Ferro Enamel Corp., Cleveland, and will head its industrial oven division.

• **J. H. Morrison** has been appointed general works manager of the Sharon Steel Corp. He goes to Sharon from the Pittsburgh Steel Co., where he was general superintendent of the hot mills at the Monessen and Allenport works of the company. He will have charge of the Sharon and Lowellville plants. In 1915 he entered the employ of the Youngstown Iron & Steel Co., which later was absorbed by Sharon Steel Hoop Co. In 1936 he went to Monessen as superintendent of the blooming, bar and billet mills of Pittsburgh Steel Co., a year later being given supervision also of the rod mill. In 1938 he became general superintendent of all the hot mills at Monessen and the tube mills at Allenport.

Personals

Change is inevitable in progressive Industry. Change is constant.

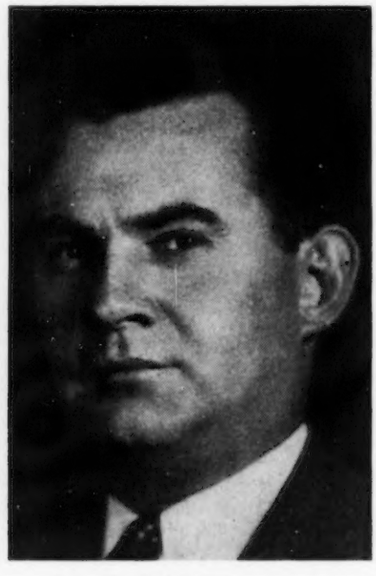
• **B. L. Waters,** heretofore president of the Lyon Metal Products, Inc., Aurora, Ill., has been elected chairman of the board, succeeding **H. A. Gardner,** who has resigned. **Earl D. Power,** the new president, was formerly vice-president and general manager. Mr. Waters, who founded the Lyon company, has announced his intention of retiring from active participation in the every-day affairs of the company. Mr. Power, the new president, joined the Lyon organization 12 years ago as manager of one of its sales divisions. He was formerly assistant to the vice-president and general manager of the White Motor Co., Cleveland.

• **John E. Russell,** formerly executive vice-president of the Browning Arms Co., has been elected president of the Majestic Mfg. Co., St. Louis.

• **E. A. Schwartz,** for the past 17 years open hearth superintendent at the Brier Hill plant of Youngstown Sheet & Tube Co., has been made full-time chairman of Republic Steel Corp.'s open hearth committee. He gained his first experience in the steel business in the engineering department of the National Tube Co. Subsequently he went to Jones & Laughlin in plant engineering work.

• **Harry J. Sweeney,** who has been identified with Republic's metallurgical department since 1936, has been made chief metallurgist of the company's Youngstown district. He received his B.S. in metallurgical engineering from the University of Cincinnati and was subsequently employed by the Car-

B. L. WATERS, chairman of the board of Lyon Metal Products.



Inc. Earl D. Power, new president of Lyon Metal Products.

negie Steel Co. in the combustion and metallurgical department, later being made assistant superintendent of the open hearth department.

• **Walter S. Scott,** identified with Republic Steel Corp. since 1914, has been made superintendent of the bessemer department of the Youngstown district. He is a graduate of Carnegie Institute of Technology and was employed as a machinist with the Patterson Foundry & Machine Co. before joining Republic. For many years he worked in the metallurgical department and was made superintendent of bessemer converters and superintendent of bessemer rolling mills in 1934. Later he was transferred to the electric weld tube mill as assistant superintendent.

• **Anker Winther,** who joined the York Ice Machinery Corp., York, Pa., in 1928 as a student engineer after graduation from Stevens Institute of Technology, has been appointed assistant general sales manager.

• **M. J. McKeever,** for the past 15 years identified with Crucible Steel Co. of America, New York, since 1927 at the Atlanta branch, has been appointed manager of that office, with headquarters at 381 Whitehall Street. He is a graduate of Rose Polytechnic Institute.

• **Joseph R. Vilella,** metallurgist for the United States Steel Corp. research laboratories at Kearny, N.J., gave a talk on metallographic technique at the last meeting of the Milwaukee chapter of the American Society for Metals.

• **Allen C. Siebers,** personnel director for the West Allis, Wis., vocational school, explained some of the features of his profession at the recent meeting of the Milwaukee Society for the Advancement of Management. He advocated the use of trade and psychological tests to eliminate misfits from industry.

• **P. J. Christy** has been appointed manager of the Philadelphia office of the Chicago Pneumatic Tool Co., New York, succeeding **A. M. Brown,** who has been transferred to the newly-opened Washington office. **C. A. Diehl** has been made manager of the Houston, Tex., office.

• **Richard S. Falk,** public relations director of the Falk Corp., Milwaukee, has been appointed by **Mayor Carl Zeidler** of that city as a member of the Milwaukee harbor commission.

• **Charles G. Atkin,** heretofore vice-president and contract manager of the H. K. Ferguson Co., Cleveland, has been made vice-president in charge of all engineering. He became associated with the company in 1930 and was previously identified with Lockwood Greene Engineers, Inc., as Cleveland district manager.

• **Wade R. Weaver,** formerly employed by the old Corrigan McKinney Steel Co. as open hearth metallurgist, assistant chief metallurgist and superintendent of inspection and conditioning, has been made assistant superintendent of Republic's open hearth furnaces. Youngstown district. He went to the Youngstown district last February as superintendent of open hearth blooming mills.

• **Clayton W. Morehead,** who joined Republic's open hearth furnace department, Youngstown, in 1933, has been made assistant superintendent of the open hearth 40, 21 and 18-in, mills, Youngstown district. He received his E.E. degree from Princeton University in 1933.

• **John E. Garlent** has been appointed executive vice-president of the Motor Wheel Corp., Lansing, Mich. He will retain his position of vice-president in charge of manufacturing, which he has held for the past six years. He has been prominently identified with Motor Wheel Corp. and the automotive parts industry for many years, having been associated with Motor Wheel since its organization in 1920.

M. J. McKEEVER, manager of the Atlanta branch office of Crucible Steel Co. of America.

CHARLES G. ATKIN, vice-president in charge of engineering of H. K. Ferguson Co.

• **Geore M. Class** has been elected a vice-president of the Gisholt Machine Co., Madison, Wis., in charge of the engineering division. The new office gives the firm three vice-presidents.

• **Wallace W. Liepner,** architectural engineer, has been appointed by Porcelain Steels, Inc., Cleveland, head of the porcelain enamel roofing and siding division in charge of sales engineering. He has been active in architectural engineering for 20 years and associated with several large companies.

• **George S. Jameson,** supervisor of order and stores at the West Lynn works of the General Electric Co., has retired after 52 years of service with the company. He was born in West Lynn in 1874, went to work for the Thomson Huston Electric Co., now the Gen-

eral Electric Co., in 1888. He was made assistant to the supervisor of order and stores in 1900, and supervisor in 1918.

• **H. E. Ardahl,** formerly chief metallurgist of the John Deere Tractor Co., Waterloo, Iowa, has been appointed assistant to the vice-president of Michiana Products Corp., Michigan City, Ind. **LeRue P. Bensing** has been made Michiana Products representative in the Cleveland territory, with headquarters at 202 Plymouth Building.

• **Thomas J. Moore** has been made manager of sales of Hill-Chase & Co., Philadelphia. Mr. Moore was associated with the Halcomb Steel Co., the Rupp-Moore Co., which he organized, the Columbia Steel & Shafting Co., and Edgar T. Ward's Sons Co. before going to Hill-Chase.

• **George E. Smith** has been elected a vice-president and treasurer of the Crosley Corp. Mr. Smith goes to the Crosley Corp. from the United Wall Paper Factories, Inc., Chicago, where he was general manager of the operations in the ten branches of that company, and had supervision over all manufacturing and engineering functions. His previous connections include the Nash-Kelvinator Co., the Budd Wheel Co., the Edward G. Budd Mfg. Co., and Gimbel Brothers in Philadelphia.

W. Richison Schofield, formerly chief engineer of Leeds & Northrup Co., Philadelphia, has been appointed director of engineering. **John W. Harsch,** who has been assistant chief engineer, has been advanced to chief engineer, and **John F. Quereau** succeeds Mr. Harsch as assistant chief engineer.

Mr. Schofield joined Leeds & Northrup in 1916 and has been chief engineer since 1928. He holds a number of patents in pyrometry and automatic control and is an active member of the ASME committee on industrial instruments and regulators.

Mr. Harsch has been with the company since 1924, and was made assistant chief engineer four years later. He is largely responsible for the design of the Homo tempering and Homocarb carburizing furnaces and is vice-chairman of the Philadelphia chapter of the ASM.

Mr. Quereau joined the company in 1929 and is the inventor of a number of thermocouple and resistance thermometer devices.

John E. Mateer, who has been open hearth melter foreman of Lukens Steel Co., Coatesville, Pa., since 1927, has been promoted to assistant open hearth superintendent. He succeeds **Herman J. Hoffman,** who was recently appointed open hearth superintendent of the company.

Mr. Mateer was born in Middletown, Pa., on Sept. 12, 1892. He went to Lukens in March, 1907, as door boy in the open hearth department. Re worked successively in the open hearth as second helper and first helper until 1918, when he became a melter, in which capacity he continued until his appointment as melter foreman in 1927.

Gray Iron Founders Elect C. J. Miller

• • • **The Gray Iron Founders'** Society, Inc., held its annual meeting at the Hotel Cleveland in Cleveland on Sept. 12th. Foundry executives were present from practically all parts of the United States including Seattle, Washington, Houston, Texas, St. Louis, and the Atlantic seaboard.

The main points discussed were the cooperation of foundries to meet the problems of national defense and interpretation of standard terms of sale of the gray iron industry. Officers elected for the coming year were:

President, C. J. Miller, president, Fremont Foundry Co., Fremont, Ohio.

Vice-president, Ronald E. Kucher, vice-president, Olympic Foundry Co., Seattle, Washington.

Secretary, John H. Pohlman, president, Pohlman Foundry Co., Inc., Buffalo, N. Y.

Treasurer, Stanley C. Mefford, treasurer, Auburn Foundry Inc., Auburn, Ind.

W. W. Rose was reelected executive vice-president.

Obituary

• **Maxon A. Blessing,** for 46 years in the employ of the Jones & Laughlin Steel Corp., died at his home in Wilmette, Ill., on Sept 7, aged 60 years. Starting with Jones & Laughlin at the age of 13, Mr. Blessing rose through the ranks to the position of Chicago district sales manager, which he held for 12 years. At the time of his death, he had served almost two years as Chicago warehouse manager. He was president of the Chicago Steel Warehouse Association and a member of many other organizations and societies.

• **Charles E. Meech,** for many years secretary and treasurer and one of the founders of the Wilmarth & Morman Co., Grand Rapids, Mich., maker of grinding machines, died at his home in that city on Sept. 9, aged 82 years. He was identified with the company from its inception in 1900 to its merger with the Hanchett Mfg. Co. in 1928.

• **Harold F. Barry,** president of the Worcester Taper Pin Co., died Sept. 13 of a heart attack at his home in Worcester, Mass. He was born in that city 42 years ago. He served at the Mexican border and in the World War and last April was elected national commander of the 104th infantry, A.E.F. Veterans' Association.

• **Charles Rice,** purchasing agent for Consumers Power Co., Jackson, Mich., was buried Sept. 3 at Jackson. He died of a heart attack at the age of 54.

• **John Gessner,** who retired as secretary and auditor of the Milwaukee Steel Foundry Co., Milwaukee, several years ago, died Sept. 8 in a Milwaukee hospital after a week's illness. He was 64 years old. He was identified with the foundry firm for 17 years.

Metal Working Activity

. . . Latest Data Assembled by The Iron Age

From Recognized Sources. In Net Tons.

	August 1940	July 1940	June 1940	July 1939	7 Months 1940	7 Months 1939
Steel Ingots:						
Monthly output[a]	6,033,037	5,595,070	5,532,910	3,564,827	34,273,194	24,523,550
Average weekly output[a]	1,361,859	1,265,853	1,289,723	806,522	1,126,296	809,625
Per cent of capacity[a]	89.72	83.40	89.47	52.74	74.20	53.09
Pig Iron:						
Monthly output[b]		4,053,945	3,818,897	2,639,022	25,137,545	16,664,075
Raw Materials:						
Coke output[c]		4,842,891	4,525,526	3,401,200	31,182,331	21,935,300
Lake Ore consumed[d]		6,153,236	5,838,223	3,520,537	36,765,822	22,527,930
Scrap Iron consumed[r]		3,949,120	3,899,840	2,516,640	24,846,560	17,316,320
Castings:						
Malleable, orders[e]		45,025	36,503	29,892	263,450	223,154
Steel, orders[e]		67,035	59,661	34,804	339,041	264,960
Finished Steel:						
Trackwork shipments[a]	6,480	6,063	6,075	5,330	27,068	25,639
Fabricated shape orders[f]		184,499	109,744	114,056	803,730	780,303
Fabricated plate orders[e]		.....	48,639	31,364	*220,323*	208,401
U. S. Steel Corp. shipments[g]	1,455,604	1,296,887	1,209,684	745,364	7,585,285	5,583,768
Fabricated Products:						
Automobile production[h]		231,703	344,636**	209,359	2,660,231	2,171,348
Steel furniture shipments[e]		.....	$2,159,626	$1,566,978	*$13,222,382*	$12,176,995
Steel boiler orders[e] (sq. ft.)		.....	1,740,127	772,094	*5,537,575*	6,011,187
Locomotives ordered[i]	65	51	31	4	236	156
Freight cars ordered[i]	7,645	5,846	4,235	0	16,431	9,077
Machine tool index[j]		88.3	92.3	65.8	92.3	60.5††
Foundry equipment index[k]		194.4	164.9	*	157.4	*
Gear sales index[s]	191	141.0	129.0	89.0	126.0††	92.0††
Non-Ferrous Metals: (U. S. only)						
Lead shipments[l]		.....	49,904	42,636	*268,723*	275,042
Lead stocks[l]		.....	55,343	124,017	.....	.....
Zinc shipments[m]	64,065	57,606	53,945	43,128	371,444	288,418
Zinc stocks[m]	44,670	58,796	65,227	131,782	.....	.....
Tin deliveries[n] (gross tons)	12,470	7,325	10,332	5,908	57,934	39,508
Refined copper deliveries[o]	96,383	71,226	61,716	59,681	490,093	357,092
Refined copper stocks[o]	198,730	215,823	199,586	316,543	.....	.....
Exports:						
Total iron and steel[p]		.....	1,048,373	575,304	*4,761,925*	3,612,998
All rolled and finished steel[p]		.....	351,550	148,596	*1,998,537*	1,025,212
Semi-finished steel[p]		.....	285,884	19,006	*865,685*	98,540
Scrap[p]		.....	356,573	391,416	*1,658,838*	2,389,297
Imports:						
Total iron and steel[p]		.....	6,166	34,553	*44,854*	232,786
Pig iron[p]		.....	720	6,932	*6,468*	24,688
All rolled and finished steel[p]		.....	1,117	16,172	*11,135*	134,232

Data in italics are six months' totals.

Source of data: [a] American Iron and Steel Institute; [b] THE IRON AGE; [c] Bureau of Mines; [d] Lake Superior Iron Ore Association; [e] Bureau of the Census; [f] American Institute of Steel Construction; [g] United States Steel Corp.; [h] Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; [i] *Railway Age;* [j] National Machine Tool Builders Association; [k] Foundry Equipment Manufacturers Association; [l] American Bureau of Metal Statistics; [m] American Zinc Institute; [n] New York Commodity Exchange; [o] Copper Institute; [p] Department of Commerce; [r] Institute of Scrap Iron and Steel; [s] American Gear Manufacturers Association.

†Six months' average. ††Seven months' average. *Not available.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type; Declines in Italics

	Sept. 17, 1940	Sept. 10, 1940	Aug. 20, 1940	Sept. 19, 1939
Flat Rolled Steel: (Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.00
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.00
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate	$5.00	$5.00	$5.00	$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.40
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grvd.)	1.90	1.90	1.90	1.90

	Sept. 17, 1940	Sept. 10, 1940	Aug. 20, 1940	Sept. 19, 1939
Pig Iron: (Per Gross Ton)				
No. 2 fdy., Philadelphia	$24.84	$24.84	$24.84	$24.84
No. 2, Valley furnace	23.00	23.00	23.00	23.00
No. 2, Southern Cin'ti	23.06	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	23.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	24.34
Basic, Valley furnace	22.50	22.50	22.50	22.50
Malleable, Chicago†	23.00	23.00	23.00	23.00
Malleable, Valley	23.00	23.00	23.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

	Sept. 17, 1940	Sept. 10, 1940	Aug. 20, 1940	Sept. 19, 1939
Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.25	$20.25	$18.75	$21.75
Heavy melt'g steel, Phila.	**20.625**	20.50	19.75	19.00
Heavy melt'g steel, Ch'go	**19.50**	19.00	18.50	17.00
Carwheels, Chicago	**20.25**	19.75	18.75	15.75
Carwheels, Philadelphia	22.25	22.25	21.25	19.50
No. 1 cast, Pittsburgh	20.25	20.25	19.75	22.25
No. 1 cast, Philadelphia	22.25	22.25	21.75	19.75
No. 1 cast, Ch'go (net ton)	**17.75**	17.25	16.75	15.75
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$4.75	$4.75	$4.75	$4.75
Foundry coke, prompt	5.25	5.25	5.25	5.50
Non-Ferrous Metals: (Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.*	11.50	11.50	11.00	12.00
Copper, Lake, New York	11.50	11.50	11.00	12.00
Tin (Straits), New York	50.05	50.05	51.375	Nominal
Zinc, East St. Louis	6.85	6.85	6.50	6.25
Lead, St. Louis	4.75	4.75	4.60	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	14.00

*Mine producers only.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 129 to 138 herein.
On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Sept. 17, 1940	2.261c. a Lb.	$22.61 a Gross Ton	$20.13 a Gross Ton
One week ago	2.261c. a Lb.	$22.61 a Gross Ton	$19.92 a Gross Ton
One month ago	2.261c. a Lb.	$22.61 a Gross Ton	$19.00 a Gross Ton
One year ago	2.236c. a Lb.	$22.61 a Gross Ton	$19.25 a Gross Ton

	FINISHED STEEL High	FINISHED STEEL Low	PIG IRON High	PIG IRON Low	SCRAP STEEL High	SCRAP STEEL Low
1940	2.261c., Jan. 2	2.211c., Apr. 16			$20.13, Sept. 17	$16.04, Apr. 9
1939	2.286c., Jan. 3	2.236c., May 16	$22.61, Sept. 19	$20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.512c., May 17	2.211c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 10
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.236c., May 28	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

• National defense steel requirements growing, but may not reach peak until first quarter . . . Automobile industry and railroads needs also expanding . . . Steel operations at year's high of 93 per cent . . . Scrap prices continue advance.

WITH steel requirements for the national defense program still a long way from their peak, producers are becoming more concerned over the possibility of a shortage of raw steel. Even now, with potential tonnage much greater than actual defense bookings of steel, the steel melting capacity of a number of the country's leading plants is being pushed to maximum capacity.

The fact that the industry's rate has not reached 100 per cent is due to slacker operations at some of the smaller plants, particularly those engaged mainly in the light products, and the comparatively small utilization of bessemer capacity, which last month was operated at only 72.59 per cent against 91.13 per cent for open hearth.

Those in Washington and in the industry who are in closest touch with the requirements of the defense program are of the opinion that the full impact on the steel industry may not be felt before the first quarter of next year. It is likewise the opinion of these same authorities that not less than two years of high activity for the steel industry lie ahead regardless of the duration or outcome of the war.

While all of the large defense contracts being announced in Washington will not immediately be translated into orders for steel, as there are inevitable lags, the amount of incoming business that can be directly or indirectly traced to defense projects is growing and probably accounts for a moderate increase in aggregate sales so far this month over the corresponding August period.

THE ramifications of the defense program are now such that nearly all branches of the metal-working industry are feeling its effects or will be soon. In the forefront at the moment is construction of new plants and facilities, which has brought this week a total of 50,700 tons of fabricated structural steel inquiries, among which are 9000 tons for a Ford Motor Co. plant, 3500 tons for a gun assembly plant at Washington, 3500 tons for an ordnance plant at Charlestown, Ind., and 1500 tons for an assembly and repair plant at the Quonset Point, R. I., naval airplane base. The largest inquiries, totaling 20,000 tons, however, are for Long Island Railroad work in Brooklyn. In the awards of 25,500 tons are more bridges and schools than defense projects.

Among the authorized projects which will bring expanding demands for steel are the big Navy program, which must be preceded by considerable expansion of shipyards; the Army program, which up to Sept. 7 had resulted in the awarding of contracts totaling $807,041,212; the construction of Army cantonments for the new conscription Army; the $150,000,000 emergency housing program to provide dwellings at defense plants, which is in addition to $100,000,000 program for Army and Navy housing; the $200,000,000 public roads program to improve highways leading to Army and Navy bases.

Contracts totaling $22,588,607 for artillery materiel have been divided among several companies. These and other contracts will necessitate an expansion of facilities for heavy forgings, which is being provided for by a $40,000,000 expenditure of equipment announced by the Defense Commission.

In addition to its special requirements, the Navy is taking bids this week and next on 103,796 tons of steel for ordinary needs. The new Navy shipbuilding program will take an estimated total of 750,000 tons of steel, including armor plate, stainless and other alloys.

CHANNELS of steel consumption in which government sponsorship is not directly a factor are also showing expansion. The automobile industry, which may soon be producing about 100,000 cars a week, is taking more steel, and the railroad program, after a temporary lull, has brought out inquiries this week for a total of 4500 to 5000 cars. The New York Central has authorized the purchase of 65,000 tons of rails. Other roads will also buy soon. The rail buying movement this fall is expected to approximate last fall's total of a little under 1,000,000 tons.

The British are still buying heavily, though there has been a little lull in shipments to permit ships to be used for conveying food to Britain. Closer contact between the British Purchasing Commission and the U. S. Government is indicated by the opening of offices by the Commission in the Willard Hotel, Washington.

A report from Europe to THE IRON AGE states that some German steel plants have been severely damaged by bombs. British spokesmen here say, however, that no British steel plants have been damaged.

With steel plant operations moving upward, averaging 93 per cent this week, scrap prices continue to follow the same trend. THE IRON AGE scrap composite price is up 21c. this week to $20.13, highest level since the first week of November, 1939, and $2.37 below the 1939 high established early in October.

The Industrial Pace . . .

RESUMPTION OF FULL-TIME activity in the past week by the heavy goods industries after the Labor Day holiday gave THE IRON AGE index of capital goods activity the sharpest upward push in over a year. The index for the week ended Sept. 14 was 97.7, as compared with 92.2 in the preceding week and 85.1 a month ago. The past week's index has been exceeded this year in only the first three weeks of the present year and is only 5.1 points below the high point of that period.

The week's largest gain was recorded by the automobile series, which rose 14.6 points to 74.5. The rise in automobile production since this year's changeover point has been exceptionally rapid. In five weeks assemblies have risen from 11,635 units to 63,240, a gain of 51,605 cars. In the five weeks following the low point in 1938 the gain was 2310 cars. However, in 1937 in the same period the rise was 62,125 units.

The construction industry continues to contribute heavily to the advance in the index. Total construction awards placed in the past week were $68,705,000, as compared with $76,561,000 two weeks ago. A sharp rise in privately financed work characterized the past week's construction activity, the private total for the week being $32,769,000, fourth highest weekly total this year, and comparing with $17,993,000 in the preceding week. Public financed work declined in the week to $35,936,000 from $58,568,000 in the previous period. Largest contributions to the week's private gain were awards for new plant facilities for the oil industry.

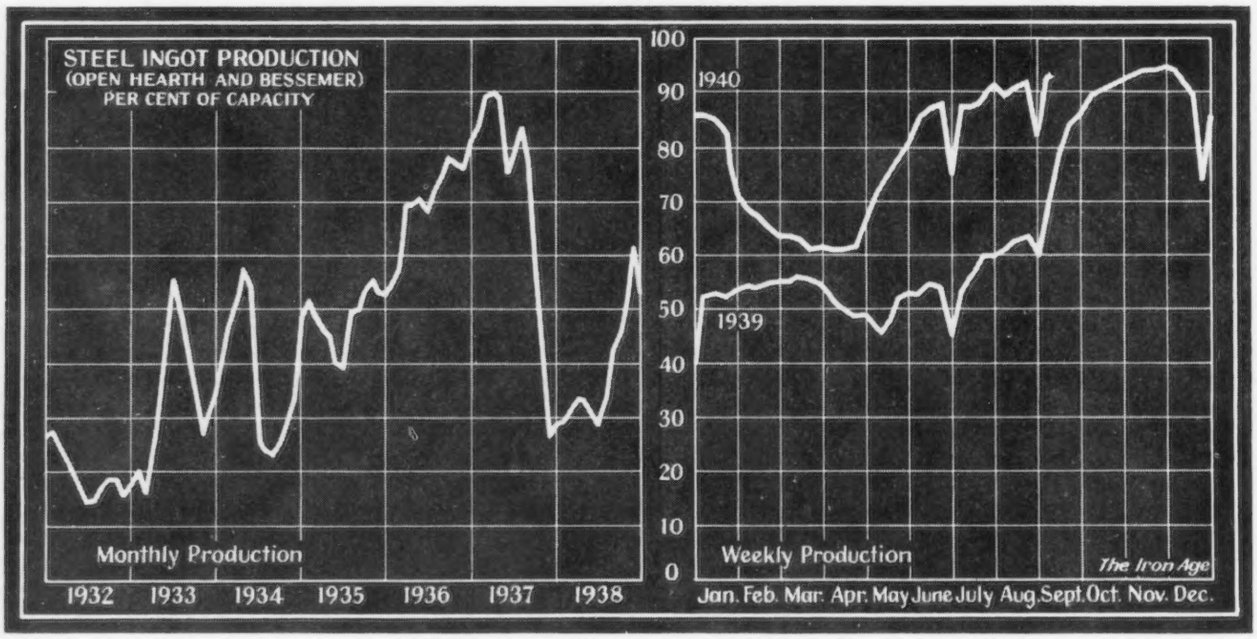
BOTH THE STEEL SERIES and the lumber carloading series were higher for the week, the Pittsburgh component being the only factor to show a loss. The loss in this component was largely a reflection of the holiday let-down, as it lags a week behind other index factors.

The steadily expanding demand for steel products in recent months is well illustrated by the rise in shipments of finished steel products (see graph) by the U. S. Steel Corp. August shipments, 1,455,604 tons, were highest since March, 1937, exceeding the 1939 peak for the first time this year. The 1937 peak occurred in March, when 1,563,113 tons were shipped. The shipments in August were equal to 88.6 per cent of the corporation's finishing capacity, 4.1 points below the March, 1937, high point.

Despite the steadily increasing demand for steel over the past five months, prices, as measured by THE IRON AGE finished steel price composite, have remained unchanged since the period of price cutting in April (see graph). Shipments of the low-priced material booked in April, while not yet entirely cleaned up, is very nearly all shipped, and prices through the balance of the quarter should reflect the full market level.

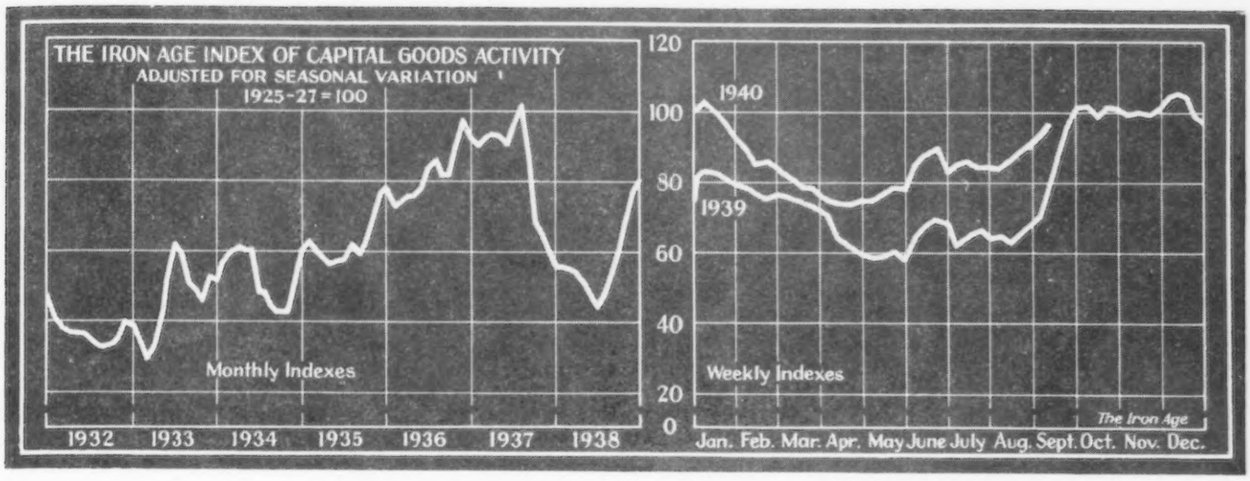
If the price situation remains stable for the remainder of the year, the average price for finished steel products in 1940 will be 2.259c. a lb., as compared with an average monthly price in 1939 of 2.257c.

Ingot Output at New 1940 Peak



District Ingot Production, Per Cent of Capacity		Pitts-burgh	Chicago	Valleys	Phila-delphia	Cleve-land	Buffalo	Wheel-ing	Detroit	Southern	S. Ohio River	West-ern	St. Louis	East-ern	Aggre-gate
	Current Week..	88.0	98.0	92.0	93.0	86.5	104.5	104.0	100.0	105.0	96.5	69.0	93.5	71.5	**93.0**
	Previous Week..	87.0	97.5	92.0	93.0	88.0	104.5	104.0	100.0	93.0	93.5	68.0	93.5	73.0	**92.5**

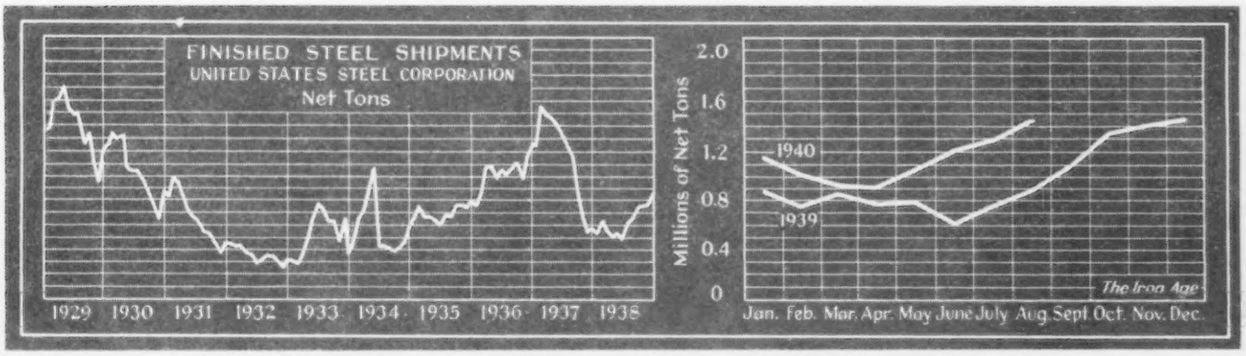
Resumption of Full-Time Operations Boosts Index to 97.7



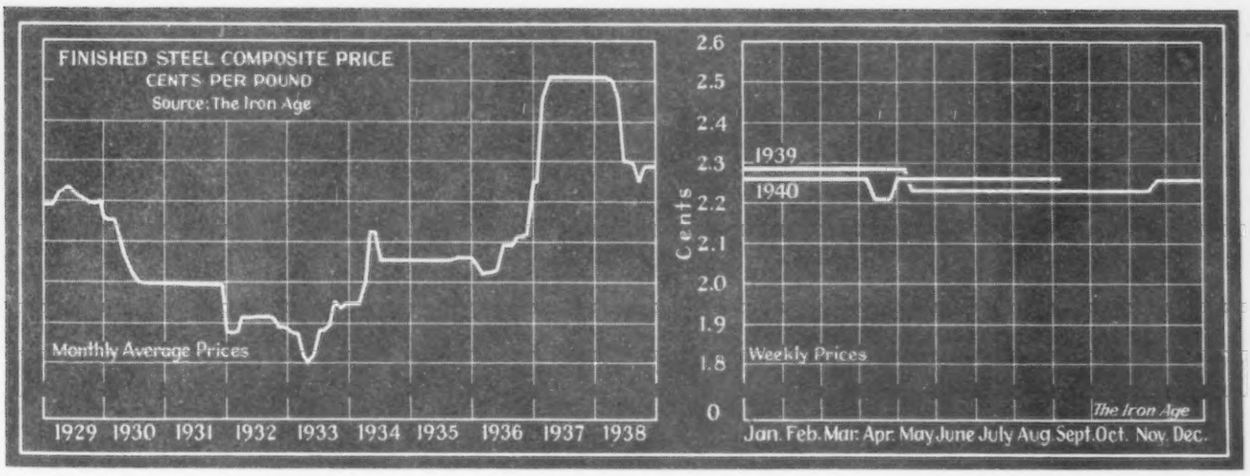
Component — Week Ended →	Sept. 14	Sept. 7	Aug. 17	Sept. 16 1939	Sept. 14 1929
Steel ingot production[1]	137.5	123.8	131.3	105.4	118.8
Automobile production[2]	74.5	59.9	25.0	81.4	111.4
Construction contracts[3]	96.0	95.4	91.0	65.7	104.2
Forest products carloadings[4]	69.6	68.9	66.1	60.6	119.7
Pittsburgh output and shipments[5]	110.7	112.8	112.0	85.7	122.6
COMBINED INDEX	97.7	92.2	85.1	79.8	115.3

Sources: [1] THE IRON AGE; [2] Wards Automotive Reports; [3] *Engineering News-Record;* [4] Association of American Railroads; [5] University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Sept. 7. Other indexes cover week of Sept. 14.

U. S. Steel August Shipments Highest in 3 1/2 Years



Finished Steel Price Unchanged by Heavy Demand



Market News

. . . THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

. . . Bookings gaining over last month . . . Defense program important factor

Steel bookings at PITTSBURGH so far this month are running from 8 to 16 per cent ahead of a month ago but the reflected improvement is not necessarily significant and the comparison may easily change within the coming week. Export demand, especially from the British, is substantially unchanged, while in the past week domestic requirements appear to be slightly more diversified. Bars, plates and structural shapes are the leading steel items, while tubes, sheets, and especially tin plate, are lagging far behind some other products in tonnages booked.

CHICAGO producers report that backlogs are building up slowly but surely for the first time in many months. This is attributable to the increasing flow of defense orders, continued general domestic demand and a growing tendency to build up inventories. The latter movement apparently does not extend beyond a three-month build-up in stocks in most cases. Just how much of incoming business is actually defense work is difficult to trace in the many orders coming through, but producers are agreed that much more than meets the eye can be traced to this source.

Bars, plates, shapes and sheets are most active among the individual products. One mill finds most of its tonnage in the bar division, while others notice a broader demand all along the line. Lengthening deliveries—two to three weeks in bars, four to five weeks in some sheets, for example—are apparently more than a temporary situation. Tin plate is the only "fly in the ointment," this item still being very slow.

Activity from automobile and truck builders, from farm equipment manufacturers, from the many firms now starting on defense projects, lead what can be definitely described as a widespread general demand in that district. An order involving anywhere from 30,000 to 50,000 tons of steel for large shell forgings and bombs is expected to be placed soon by plants in the CHICAGO district with defense contracts of this nature on hand.

New steel bookings at CLEVELAND increased considerably the past week following a lull in the demand for some products during the previous week. Orders show quite a gain over August and the tonnage entered this month is expected to exceed the August commitments. While much of the demand is due to national defense projects, many consumers, particularly of hot rolled bars, are placing orders to build up their inventories in order to have stocks should heavy requirements for national defense result, as expected, in more extended deliveries by the mills.

The trade is realizing more than heretofore the enormous amount of steel that will be required in carrying out the defense program. Fall buying has started by the agricultural implement manufacturers about a month earlier than usual. Deliveries of bars and billets are becoming more extended. Alloy steel is in very heavy demand both for the domestic trade and for export. Stainless steel continues very active. Structural shapes are moving well because of the demand for fabricated steel for new plants and extensions. Sheets are not very active owing to the absence of new orders in the automotive industry but shipments are good. Plate business has declined slightly but mills have good backlogs and some consumers are shopping around to find where they can secure early deliveries. The two most inactive products are line pipe and tin plate. Demand for merchant pipe continues good. Demand for steel for many defense projects is slow in coming out but some of the inquiries indicate the immense amount of material that will be needed. As an example of the size of some of the requirements an inquiry has come out for 800,000,000 machine gun belt links that will require approximately 2500 tons of cold rolled strip.

Philadelphia district producers report a pick-up in bookings during the past week after the slight decline of two weeks ago. Orders, for the most part, are running neck and neck with shipments, no apparent reductions having been affected in backlogs despite consistently high mill operations. Some mills report moderately increased backlogs. The preponderance of demand still runs to heavy products. Structural buying continues in heavy volume as the result of numerous construction projects of all types, including many connected indirectly with the defense program.

New bookings of heavy steel products in New York last week were larger than in any week in the past month, but sheet and strip business is still running at about 40 per cent of the August weekly average. The intensified shipbuilding program is beginning to make itself felt in numerous ways in the district. Large tonnages of marine boiler plate are pending, in addition to the substantial hull requirements. The tight situation in stainless is being rapidly aggravated by the influx of orders for various military items, including airplane parts, mess kits, etc. Domestic producers of non-military products are also ordering stainless quite heavily in an effort to build up plant stocks.

Prices

. . . Quotations on most products firmest in some time

The steel price structure appears to be in the firmest condition in some time. Except for some perennial situations like the resale pipe market, prices are relatively stable. Line pipe prices, which had been weak for some time, have been at a relatively higher level recently. While the amount of tonnage booked at the present published sheet price has not been tremendous, there have been some sizable orders recently at full prices.

In back of most of the present firmness apparently lies extended deliveries, possibility of further tightness in steel supplies, as well

as, of course, relatively high operating rates at most steel plants.

On structural business outside the area taking a Bethlehem, Pa., base, an independent eastern Pennsylvania producer is not equalizing freight charges. Prices are determined by using the mill as a base, and adding full freight charges to destination.

An entire list of new extras will be effective Oct. 1 on hot rolled alloy steel plates, the product which was recently given a base price. Heretofore prices on this product were built up by use of the regular hot rolled alloy steel card in conference with consumers. The usual practice of extras on chemical, thickness, width, length, quality, test, etc., have generally been adhered to. The base price applies to hot rolled alloy steel plates as follows—

Shape—Rectangles.

Thickness means thickness at the edge of the plate ¼ to 2 in. inclusive. When ordered to weight, average weight of plates in lb. per sq. ft. 10.2 lb. to 81.6 lb. inclusive.

Width—24 in. to 100 in. inclusive.

Length—5 ft. to 30 ft.

Quality—Structural subject to ASTM standards for structural steel.

Quantity—When ordered at one time in quantities of 6000 lb. or over per item, released for shipment at one time.

Steel Operations

. . . Industry rate rises to 93 per cent, highest thus far in 1940

Steel ingot production for the country as a whole has risen further this week to 93 per cent, the highest of the year thus far and close to last year's peak rate of 94½ per cent attained in the final week of November.

Most of the leading steel companies are operating at full capacity but some of the smaller companies are yet to achieve that point. If bessemer steel making capacity were employed as fully as open hearth capacity, the rate would be higher. In August the country's bessemer capacity produced at a rate of 72.59 per cent against 91.13 per cent for open hearth. Efforts are being made by steel companies having bessemer capacity to furnish bessemer steel instead of open hearth whenever users will permit.

Only two districts lost ground this week as compared with last week. The Cleveland and New England districts were each a point and a half lower, but there were moderate gains at PITTSBURGH, CHICAGO, in SOUTHERN OHIO and in the WEST, with a sharp rise of 12 points at BIRMINGHAM.

Pig Iron

. . . Shipments are gaining and new buying is moderately better

Still not affected by the national defense program to the extent that the steel industry has been helped, merchant pig iron trade is only moderately better. With an increase in the foundry melt, shipments are gaining and in some districts there has been a gain in new buying which is orderly and has none of the characteristics of a rush to get under cover. In fact, many melters have covered their requirements well ahead.

From CHICAGO it is reported that more and more foundries are getting work that may be traced to the national defense program, but the heaviest demand is coming from the automobile industry, the railroads, the tractor builders and the agricultural implement plants. Shipments of pig iron and foundry coke to CHICAGO consumers are increasing somewhat. September is expected to show a sizable gain over August.

At PITTSBURGH demand has improved slightly. Ingot mold makers are among those taking larger tonnages. Movement of basic pig iron to steel plants is heavy.

Shipping orders at CLEVELAND have gained somewhat this month. As shipments are far in excess of production with some makers, producers' inventories have shrunk sharply. With the stepping up of motor car output, demand from automobile foundries is expected by CLEVELAND producers to be larger this month.

At CINCINNATI shipments are holding at a good level, but new buying is light because most melters have covered their anticipated requirements to the end of the year. Shipments in the ST. LOUIS district are gaining as steel mills, railroad shops and general foundries step up their melt.

In the NEW YORK district many consumers have on order sufficient iron to carry them into 1941. Orders and shipments are both heavier in the PHILADELPHIA district. Although the NEW ENGLAND melt is estimated at 80 per cent of capacity, there are as yet no indications of a strong buying movement for forward coverage.

All of the 18 furnaces in the BIRMINGHAM district continue in blast. An improvement in shipments of merchant iron is attributed partly to the inability of foundries to obtain adequate supplies of good scrap.

The Carnegie-Illinois Steel Corp. has blown in its No. 3 furnace at Mingo Junction works, making two of three there now active.

A Federal furnace of Interlake Iron Corp. at CHICAGO was blown in last Thursday and the second Federal stack will probably come in late this week. Thirty-two of the Chicago district's 37 blast furnaces are in operation.

Structural Steel

. . . New projects upward of 50,000 tons, awards 25,500 tons

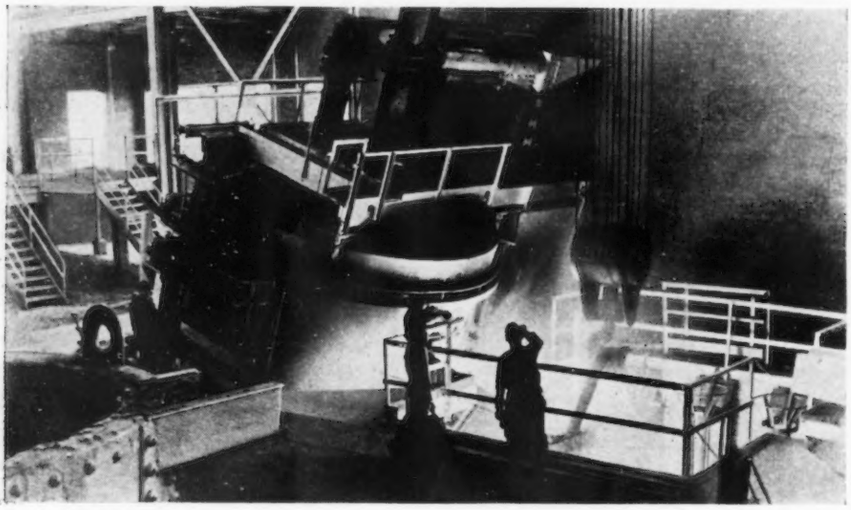
New structural steel projects of 50,700 tons are the highest this year. Outstanding new jobs are 15,000 tons for the Long Island Railroad viaduct at Rockaway Beach, New York, for grade elimination; 9000 to 10,000 tons for a Ford Motor Co. plant, Detroit; 5000 tons for the Atlantic Avenue subway, Brooklyn, for the Long Island Railroad; 3500 tons for an extension to a gun assembly shop at Washington; 3500 tons for an ordnance plant at Charlestown, Ind.; 1500 tons for an assembly and repair plant at Quonset Point, R. I., for the Navy Department; 1400 tons for a mineral industrial building for the West Virginia University, Morgantown, W. Va.; 1100 tons for a steam power plan at Watts Bar Dam for the TVA, and 1100 tons for warehouse extensions at Mansfield, Ohio, for the Westinghouse Electric & Mfg. Co.

Fabricated structural steel awards declined to 25,500 tons from 35,500 tons last week. The largest lettings include 6500 tons for a highway bridge at St. Georges, Del., over the Chesapeake and Delaware Canal; 3000 tons for the Benjamin Franklin High School, New York; 1900 tons for the Woodrow Wilson High School,

Queens, New York; 1700 tons for Government warehouses at Jeffersonville, Ind.; 1170 tons for a bridge over the Rappahannock River at Fredericksburg, Va., and 1000 tons for an apartment building in New York at Park Avenue and 61st Street.

At the rate structural specifications are being received at PITTSBURGH, backlogs are mounting, mills are running at capacity, and deliveries are becoming further extended. The simultaneous placement of large government defense programs coupled with other federal financed projects as well as privately financed projects, portends one of the most active seasons in heavy steel production in several years.

The general contractor is expected to ask for bids in about two weeks for the government powder plant to be built near Ravenna, Ohio. Information so far available indicates that this plant, consisting of many small steel frame buildings, will take 11,000 tons of structural shapes.



SWINDELL

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Produce Top Quality Steel at Lower Cost!

The photograph shows one of a pair of 16'0" Swindell swinging-roof electric arc melting furnaces, each 35-ton capacity, at the Copperweld Steel Co., Warren, Ohio.

SWINDELL-DRESSLER CORPORATION

PITTSBURGH, PA.

Sheets and Strip

. . . Shipments are heavier than new business

Sheet specifications at PITTSBURGH so far this month are not up to the volume placed in the same August period. The decline has been more severe in cold rolled material, however, support having been given to hot rolled sheet volume by miscellaneous consumers. Shipments, however, are holding up much better than new business owing to the rapid movement of automotive body sheets before the deadline on low priced material is reached at the end of this month.

If automotive specifications were removed from August tabulations, miscellaneous sheet and strip demand so far this month would probably be slightly improved.

New demand for sheets and strip in the CLEVELAND territory is only moderately active. The automotive industry continues to issue releases and fresh orders are looked for from this source as soon as production schedules are stepped up on new models. Government work is expected to require large tonnages but numerous armament projects are not far enough along to benefit the mills.

Active buyers of sheets at CHICAGO are farm implement manufacturers with automotive demand continuing as strong as expected. A heavier tonnage in sheets was booked last week over the previous week but September orders are just about equal to those for the same period in August. With automotive releases increasing, most of the low-priced tonnage will soon be shipped. Another general buy from the motor car industry is not looked for until late October. Warehouse activity is much stronger as miscellaneous sheet demand spreads.

Plates

. . . Demand is heavy, particularly for wide material

Plate sales at PITTSBURGH are in considerably better volume than a month ago, deliveries are further behind on wide plates, and expected requirements from the national de-

fense program including shipbuilding, indicate a tight delivery situation for some months to come. Seasonal demand from farm implement makers, tank producers, as well as expected freight car placements, will complicate matters further for producers.

Led by the order recently placed with Manitowoc Shipbuilding Co., Manitowoc, Wis., for 10 submarines, an already strong market for plates bids fair to gather strength as defense orders flow into the CHICAGO district.

Eastern plate fabricators are busier and miscellaneous orders around PHILADELPHIA have shown a noticeable increase. Coupled with shipyard buying, this business is supplying ample volume to the plate market there.

Railroad Buying

. . . N. Y. Central to buy 65,000 tons of rails . . . More equipment inquiries

Rail buying took the spotlight in the railroad market last week. with Rio Grande do Sul Railway of Brazil awarding 22,500 tons of rails to Inland Steel Co., and New York Central authorizing purchase of 65,000 tons for 1941. The Brazilian purchase will be financed in part by U. S. Export-Import Bank. The buy of Rio Grande do Sul brings total purchases of Brazilian roads from United States mills so far this year to 42,500 tons, the Central of Brazil having previously placed 20,000 tons with Carnegie-Illinois Steel Corp.

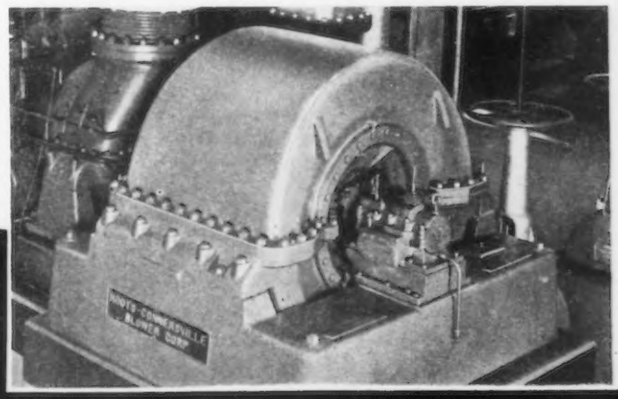
Largest new equipment inquiry reported in past week was for the Southern, involving 1500 box cars, 750 hopper cars and 750 gondolas. Pittsburgh & Lake Erie is contemplating the purchase of 1000 hopper cars. Norfolk & Western plans to buy from 500 to 1000 gondolas. Louisville & Nashville has awarded 500 hopper cars to Pullman-Standard Car Mfg. Co. Seaboard Air Line has applied for authority to sell $1,200,000 in equipment trust certificates to RFC to purchase 15 streamlined passenger train cars from Edward G. Budd Mfg. Co., 50 cement cars from Pullman-Standard Car Mfg. Co. and one diesel locomotive from Electro-Motive Corp.

Boston & Maine has ordered three 4-8-2 locomotives from Baldwin Locomotive Works and Chattanooga Traction Co. has placed two diesel-electric switchers with General Electric Co. The Southern has taken bids on two diesel-electric switchers.

Merchant Bars

. . . National Defense orders and inquiries are growing

Hot rolled bar sales at PITTSBURGH so far this month are running ahead of the corresponding August period and in some instances the improvement has been as much as 8 per cent. Deliveries on certain sized bars are becoming further extended, although some of the larger sizes can be had sooner than small shapes and bars. Although automotive demand has been fair, the miscellaneous character of incoming business as well as the steady improvement in volume certainly suggests recent expansion in bar business slated for



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national defense projects.

Demand for hot rolled bars in CLEVELAND is heavy, orders having gained sharply after a lull during the first week of the month. Many consumers apparently are building up inventories. Business is particularly heavy from cold drawing plants. Agricultural implement manufacturers are buying quite freely, having come into the market about a month earlier than usually for their fall requirements. Deliveries are becoming more extended.

Greatest demand from consumers in the CHICAGO district is for hot rolled carbon bars. Drop forgers, farm implements, automotive, and notably, bolt and nut manufacturers all continue a steady demand for this item. Delivery promises on bars range from two to four weeks and a growing tendency to stock up is apparent. A car manufacturer has an inquiry out here for 5000 tons of 4-in. rounds for 90 mm. shells. Large orders for shell forgings and bombs are expected to be placed soon with a number of CHICAGO district plants, and possibly 30,000 to 50,000 tons of shell steel may be involved.

Bolts, Nuts and Rivets

. . . Readjustment of price inequality

Announcement of fourth quarter prices of bolts and nuts is still being deferred by CLEVELAND makers but probably will be made this week. No price changes are expected, except possibly slight revisions. Demand continues on the uptrend. Some Government and export business is coming out. Automobile manufacturers are buying a little more freely now that production of new models of cars is getting under way.

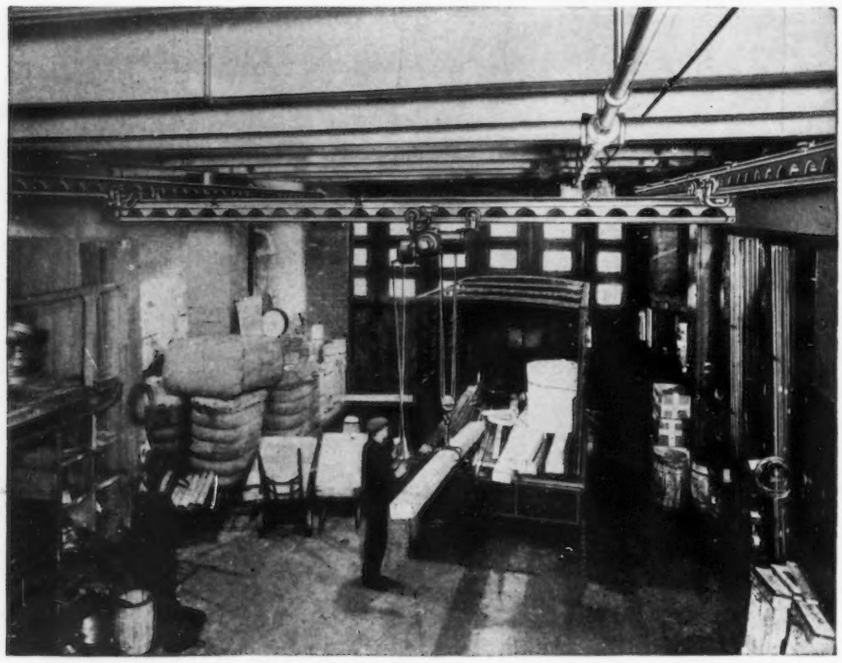
The Buffalo Bolt Co., North Tonawanda, N. Y., will have its fourth quarter price list in the mail this week. "Readjustments of inequalities in the price structure of certain items will result in a slightly increased cost for these items," company officials announced, emphasizing that these boosts do not represent a general price advance.

Wire Products

. . . Rod demand is heavy, gains in other items

Total wire rod sales at PITTSBURGH are about on a par with a month ago. Manufacturers' wire demand is slightly better and an earlier-than-usual movement of merchant wire products has materialized. Total merchant wire products booked so far this month at PITTSBURGH are running moderately ahead of the same period a month ago. Except for isolated resale markets, producers are obtaining published prices on wire nails, the present raw steel supply contributing toward this firmness.

New demand in CLEVELAND has increased and production of manufacturers' wire has been stepped up. Some mills are booked to capacity but others can take additional tonnages for early shipment. A heavy volume of business is in prospect in connection with the armament program.



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OVERHEAD MATERIALS HANDLING EQUIPMENT
Other products: CLEVELAND CRANES and STEELWELD MACHINERY

Shipbuilding

. . . Navy postpones bids on seaplane tenders and mine sweepers

The Navy Department has postponed from Sept. 25 to Oct. 16 the date for opening bids on the construction of 10 seaplane tenders. The department said that revised data will be furnished prospective bidders on Sept. 25. It also has extended until Oct. 30 the date for opening bids to construct eight mine sweepers in lots of two, three or four.

Warehouse Business

. . . New York distributers revise prices for larger lots

An extended period of price weakness in galvanized sheets was apparently ended in the past week when a number of small New York jobbers announced a revision in the largest quantity bracket. The new price, effective Sept. 16, is $4.15 a 100 lb. for bundles or over, as compared with the previous price of $3.90. Prices on 1 to 15 bundles are unchanged at $4.30. Larger warehouse interests have not adopted this revision, their quotations remaining unchanged at $4.30 for 150 to 1499 lb.; $4.05 for 1500 to 3499 lb., and $3.90 for over 3500 lb.

Tubular Goods

. . . Russia buys 25,000 tons of pipe for 170-mile line

Total tubular sales at PITTSBURGH so far this month compare favorably with a month ago but such comparisons leave much to be desired from a producers' standpoint. There has been little or no change in oil country goods demand but standard pipe requirements continue to hold at fair levels. Line pipe business has been fair. A Russian order under consideration for several months and involving 25,000 tons of 12¾-in. line pipe has been placed. The order, covering approximately 170 miles of pipe for a line in the Ural Mountains in Russia, was divided among Jones & Laughlin Steel Corp., Pittsburgh Steel Co., National Tube Co., Youngstown Sheet & Tube Co., and the Spang Chalfant division of National Supply Co.

Tin Plate

. . . Mill operations continue to decline . . . Exports light

Tin plate operations are estimated this week at 41 per cent, down three points from a week ago. As reported before, export prospects are practically nil, domestic consumers have ample stocks, and delivery is no longer a factor.

Semi-Finished Steel

. . . Steady flow of orders includes much for British

There has been little or no letdown in the flow of semi-finished steel specifications at PITTSBURGH. Export demand, mainly from the British, continues strong.

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1,000 PANS . . 50 Times Faster than Old Way

Again DoAll shows it is the most versatile and fastest method to cut all metals by sawing sample wheat pans out of tin for Stremel Bros., Minneapolis. Four stacks of 250 sheets each — held together with clamp plates —no holes bored. Total time 1 hour for complete job, 15 minutes for each stack.

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The DoAll is a moderately priced, rugged precision machine tool that replaces shaping, milling and lathe work with enormous savings of time, labor and material. Cuts out internal and external shapes from any metal up to 10″ thick.

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Machine Tools

. . . SALES, INQUIRIES AND MARKET NEWS

Some Dealers Report Lag

Chicago

• • • **Although machine tool** manufacturers are bending every effort so that they will not lag too far behind in deliveries, some dealers are experiencing a relatively quiet spell in new orders. This they attribute to the fact that defense orders have not yet started the steady flow that is expected. However, this condition is by no means universal in this district. Many dealers find no gap at all in inquiries. With an order for 10 submarines placed last week with Manitowoc Shipbuilding Co., an extensive tooling program should be forthcoming from that source. Included in a low bid submitted to Rock Island Arsenal by Pullman-Standard Car Mfg. Co. for 3000 carriages for 105-mm. guns was $362,000 for machine tools. Farm implement manufacturers still are important consumers. So are plants engaged in production of machine tools for over-booked regular manufacturers. An important note in this busy industry is that most buyers of machine tools have one eye cocked on the future and are insisting on equipment which can be converted to their normal production needs when the time comes. Demand is widely diversified, and except for some of the larger sizes, most builders are maintaining creditable delivery schedules on a goodly portion of their line.

Inquiries for Defense Work

Cleveland

• • • **New orders for machine tools** continue very heavy and there is an immense amount of new inquiry for machinery for armament work. Considerable of the inquiry is from manufacturers who have figured on government work that in many cases has not yet been placed because the appropriations have not yet been made. A further increase in the volume of inquiry is expected. Demand for machines for other armament production is not very active. However, some buyers, because of delayed deliveries, are placing orders in anticipation of their future needs and others are buying machines subject to later release dates in order to protect themselves against possible price advances.

Buyers are shopping around to find where they can secure the best deliveries and some makers of medium priced machines are getting orders that might go for higher priced tools were not the question of delivery a factor.

Machine tool plants are being geared up for increased production and shipments so far this month show a gain over August, which was considerably ahead of July.

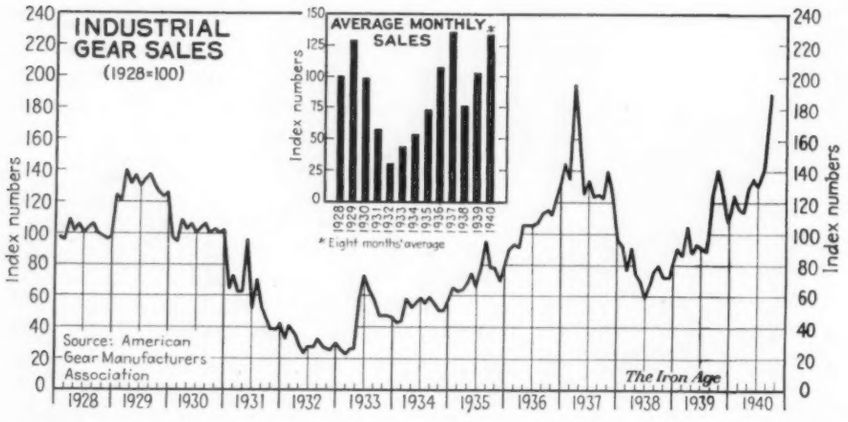
Orders placed during the week include one for a number of machines for the Diesel Engine division of General Motors in Cleveland. These include radial drills and vertical boring mills. A large inquiry, which it is estimated is in excess of $2,000,000, has come from the General Electric Co. for tools for a turbine manufacturing plant in Erie, Pa. This includes, among other tools, a number of 60-in. lathes and other large machines.

Backlogs Still Climbing

Cincinnati

• • • **Machinery bookings** and inquiry shows no diminution in the brightness of the district market. Currently, orders from British sources for shipments chiefly to Canada, combined with the defense needs and general run of retooling by industry generally, has brought the already bulging order books of district producers almost to the bursting point. In addition, the quantity of airplane retooling inquiry, the automotive retooling inquiry for armament production as well as contracts for further substantial government orders, leaves the future filled with assurances of continued heavy buying. Managements continue to wrestle with the problem of increasing production to narrow the gap between the placing of orders and delivery dates. There are a number of ideas in the fire, but except for rearrangement of existing departments and the utilizing of heretofore odd corners of plants there have been no extensive expansion programs.

August Gear Sales Second Heaviest on Record


INDUSTRIAL GEAR SALES
(1928=100)
AVERAGE MONTHLY SALES*
Index numbers
* Eight months' average
Source: American Gear Manufacturers Association
The Iron Age
1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940

INDUSTRIAL gear sales in August, exclusive of automotive gears, were the second heaviest of record, rising to within four points of the all-time high established in March, 1937, according to the index compiled by American Gear Manufacturers Association. The August index was 191, a gain of 35 per cent over the July index figure of 141, and comparing with 96 in August, 1939, and 195 in March, 1937, which was the highest point reached since the index was started in 1928. The highest index number recorded in 1939 was 141 in October. The average index for the first eight months of the current year is 134, as compared with 92 in the comparable period of 1939, and 135½ for the 12 months of 1937.

Non-Ferrous Metals

. . . MARKET ACTIVITIES AND PRICE TRENDS

New York, Sept. 17—With the exception of zinc sales, activity induced in the non-ferrous markets by the heavy buying movement in copper two weeks ago subsided noticeably during the past week. The zinc market was deceptively quiet during the week, and it was not expected that the volume of transactions would be very large. Figures appearing today, however, show the volume was in about the same proportion as that of the record-breaking previous week. Base prices of all principal metals remained firm and unchanged. Smelters' prices on electrolytic copper, which fell off ⅛c. Tuesday and another ⅛c. Wednesday, regained ⅛c. Friday and leveled off at the end of the week to 11.375c. per lb., delivered Connecticut Valley. Producers' prices on electrolytic copper remained steady all week at 11.50c. a lb. Statistics released last Wednesday showed domestic deliveries during August at about 25,000 tons higher than either those of January, 1940, or of the last five months of 1939. Refined stocks were down 17,000 tons and production of refined metal was 10,000 tons lower. Following the release of these statistics, a bullish sentiment made itself felt in the market and the price rose to its present level. Export activity has been reported recently in metal of foreign origin. Japanese buyers have taken moderate tonnages at the currently quoted price, 9.90c. per lb., f.a.s.

Lead

Demand during the week was moderate and irregular, with some sellers filling their quotas from day to day, while others had difficulty in moving material at better than 50 per cent of intake rate. Specifications were about evenly divided between September and October. September is about 95 per cent sold while October requirements are 40 per cent filled. Prices are unchanged at 4.90c. a lb., New York. Though refined stocks are said to be at their lowest point in 10 years, being equal to only about one month's shipments, it is felt that consumers will have no difficulty in obtaining sufficient material.

Zinc

The flurry of activity among buyers following the price rise and record-breaking sales of two weeks ago appeared last week, on first examination, to have subsided, the market taking on an apparent quiet although firm tone. When the week's total was reported, however, it showed sales of prime Western in excess of 18,000 tons, a figure approximately equal to that of the huge tonnage sold in the previous week. Price of prime Western holds at 7.24c. per lb., New York. The greater part of the tonnage sold last week was for delivery after December. Shipments in past week were 6484 tons, as compared with 7040 tons in the previous week. Backlogs now total better than 86,000 tons.

Tin

In a stagnant market, prices have changed but once during the week, dropping to 50.05c. a lb., New York, Monday, from the 50.10c. prevalent since last Wednesday. Government buying has been the only activity noted. The matter of the establishment of a tin smelter in this country has made no further progress, discussions continuing at Washington in the absence of a final decision.

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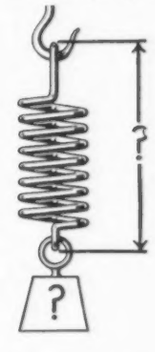

We recommend a weight test in the specifications of extension springs. The tolerance desired on that specification will tell whether no test, a spot test or 100% test is necessary. As this factor can vary the cost of a spring, it is plain that easy tolerances can save you money.

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DIVISION OF ASSOCIATED SPRING CORPORATION

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Scrap . . . MARKET ACTIVITIES AND QUOTATION TRENDS

• • • **Moderate increases** at Philadelphia and Chicago have raised THE IRON AGE scrap composite 21c. to $20.13, the highest level recorded since the first week of November, 1939, but $2.37 below the 1939 high established early in October. Heavy melting steel is 50c. higher at Chicago and 12½c. at Philadelphia, while Pittsburgh is unchanged.

While the market is still extremely strong and all factors still point to a continuance of this position for some time, a minor resistance point seems to have been reached in some districts. Price increases this week have been very moderate and appear in most cases to reflect alinement of minor grades with the sharp advances of a week ago in the primary grades.

Possibility of extension of the export licensing system, considered more in the nature of a probability by brokers and dealers, to additional grades, has to a large extent been already discounted and formal institution of further control measures will not likely have any noticeable influence on prices at the larger exporting centers. Japanese loadings in the East this month are substantially below the August level.

Pittsburgh

Market undertone continues strong, but No. 1 heavy melting is quotably unchanged this week at $20 to $20.50. Railroad heavy melting is up 50c. this week, being quotable at $22 to $22.50. Any moderately heavy buys of No. 1 heavy melting would probably reflect higher than present quoted prices, but buyers so far this week are indisposed to make any important test. Secondary grades are quotably stronger. Railroad scrap rails are not in demand from open hearths but nearby Ohio foundries are paying $1 or more above the present nominal quotations here.

Chicago

On the basis of broker-dealer transactions and mill offering prices, heavy melting steel is quoted at a flat $19.50. Brokers in most cases are paying this figure and in some instances as high as $20. Railroad heavy melting was sold last week at about $20.25, gross ton, delivered. The entire list is exceptionally strong.

Philadelphia

No. 1 steel has been sold into consumption within the past week at $20.75, a 25c. advance over the previous level. No. 2 steel is also higher. Other grades are strong at existing prices. Higher prices brought out moderate tonnages but scrap is by no means flowing freely. Dealers are turning material over immediately upon acquisition to avoid risk. Although the export market remains nominal, small tonnages to round out cargoes have been bought at $19.50 for No. 1 steel and $18.50 for the No. 2 grade, delivered Port Richmond.

Youngstown

Market here continues very firm, with unchanged prices. Mills that recently made scrap purchases are getting good shipments but for the present are making no additional commitments. Dealers are having some difficulty in buying No. 1 steel for $20.50, and as high as $21 has been paid.

Cleveland

Prices are firm and unchanged. No consumer purchases were reported during the week, activity being confined to buying by dealers to cover outstanding orders. Dealers report difficulty in buying scrap for Cleveland mills at ruling prices because of the higher prices prevailing in Youngstown district.

Buffalo

The local market continues to show increasing strength with turnings, borings and specialties advancing 50c. Scattered sales of small tonnages of No. 1 heavy melting were made in the last week within a price range of $20 to $20.50, but were not deemed sufficient to warrant an advance in quotations. Dealers report supplies now are becoming freer than in recent weeks.

Birmingham

Market trend here shows increasing strength with supplies limited. No. 1 cast as well as all steel grades, are very strong. Export demand remains heavy.

Cincinnati

The market here continues to rule very strong, but dealers' yard bids are currently unchanged. While consumers are reluctant to pay run-away prices on material, mill purchases from scrap producers direct, during the past week, are reported to have been made at better than the published quotations.

Detroit

A test of the stronger Detroit scrap market sentiment, especially on bundles, was being made this week in the sale of 235 cars of Fisher Body bundles in Michigan, along with 110 cars at Cleveland. In the absence of consumer buying during the week, prices tended to level off but dealer and broker activity continued strong.

St. Louis

Two sales of round tonnages were made to district steel mills last week, one at $15.50, the other at $16. The market is from 25c. to 50c. higher, with little coming in from the country. Brokers are cautious about making short sales.

New York

The sharp rise in THE IRON AGE composite price on Oct. 10, upon which the British scrap purchases are based, was reflected in this market in the past week by a $1 increase in dealers' buying prices on No. 1 steel for export. Buying prices for domestic account, however, are unchanged except for a few minor adjustments to aline bids here with eastern Pennsylvania prices. Buying for British contracts accounts for the bulk of current export activity, Japanese shipments having dropped to a very low level thus far this month. Albert A. Volk Co., Inc., has been awarded contract for razing the Ninth Avenue elevated structure. About 63,000 tons of structural scrap is involved. It is understood material will be shipped uncut to an eastern Pennsylvania producer, the razing contract forbidding export.

Boston

Possibility of the government being more stringent in the matter of scrap exports, and practical withdrawal of domestic consumers from the market has resulted in a very quiet market here. Occasionally a carlot of steel turnings is moved to Weirton, for which brokers pay $9.13 on cars. For bundled skeleton, Pittsburgh delivery, the market is generally $12 to $12.50, f.o.b., and for eastern Pennsylvania delivery as high as $13. Massachusetts textile machinery makers have paid all the way from $18.50 to $21, delivered, for textile cast, but are now out of the market.

Toronto

While prices held firm and unchanged in Canadian scrap market during the week some local dealers look for early advances in all steel grades. Imports continue in heavy volume and one dealer states that according to recent figures more scrap is being provided by United States for Canadian consumption than from domestic sources. Consumers importing from across the line are said to be paying higher prices delivered to plants than for scrap originating here, but so far refuse to raise bids for domestic material. This situation is causing criticism by local interests and may result in early advances here.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to $20.50
Railroad heavy mltng.	22.00 to 22.50
No. 2 heavy melting	18.50 to 19.00
Railroad scrap rails	22.50 to 23.00
Rails 3 ft. and under	25.50 to 26.00
Comp. sheet steel	20.00 to 20.50
Hand bundled sheets	19.00 to 19.50
Heavy steel axle turn.	19.50 to 20.00
Machine shop turnings	15.25 to 15.75
Short shov. turnings	17.00 to 17.50
Mixed bor. & turn.	13.50 to 14.50
Cast iron borings	13.50 to 14.50
Cast iron carwheels	21.00 to 21.50
Heavy breakable cast.	17.00 to 17.50
No. 1 cupola cast	20.00 to 20.50
RR. knuckles & coup.	26.50 to 27.00
Rail coil springs	26.50 to 27.00
Rail leaf springs	26.50 to 27.00
Rolled steel wheels	26.50 to 27.00
Low phos. billet crops	26.50 to 27.00
Low phos. punchings	26.00 to 27.00
Low phos. heavy plate	24.50 to 25.50
Railroad malleable	24.00 to 24.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $20.75
No. 2 hvy. mltng. steel.	19.50 to 19.75
Hydraulic bund., new.	20.50 to 20.75
Hydraulic bund., old	17.50 to 18.00
Steel rails for rolling	22.50 to 23.00
Cast iron carwheels	22.00 to 22.50
Hvy. breakable cast	.... 21.00
No. 1 cupola cast	22.00 to 22.50
Mixed yard (f'd'y) cast	19.00 to 19.50
Stove plate (steel wks.)	17.50 to 18.00
Railroad malleable	22.50 to 23.00
Machine shop turn.	14.50 to 15.00
No. 1 blast furnace	13.00 to 13.50
Cast borings	13.00 to 13.50
Heavy axle turnings	19.00 to 19.50
No. 1 low phos. hvy.	25.00 to 25.50
Couplers & knuckles	25.00 to 25.50
Rolled steel wheels	25.00 to 25.50
Steel axles	23.50 to 24.00
Shafting	25.00 to 25.50
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)	14.00 to 14.50

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	.... $19.50
Auto. hvy. mltng. steel alloy free	$18.00 to 18.50
No. 2 auto steel	15.75 to 16.25
Shoveling steel	.... 19.50
Factory bundles	18.50 to 19.00
Dealers' bundles	17.00 to 17.50
No. 1 busheling	18.00 to 18.50
No. 2 busheling, old	11.50 to 12.00
Rolled carwheels	22.75 to 23.25
Railroad tires, cut	23.00 to 23.50
Railroad leaf springs	22.50 to 23.00
Steel coup. & knuckles	22.50 to 23.00
Axle turnings	18.00 to 18.50
Coil springs	23.50 to 24.00
Axle turn. (elec.)	19.75 to 20.00
Low phos. punchings	22.50 to 23.00
Low phos. plates 12 in. and under	22.50 to 23.00
Cast iron borings	12.75 to 13.25
Short shov. turn.	13.50 to 14.00
Machine shop turn.	12.75 to 13.25
Rerolling rails	22.75 to 23.25
Steel rails under 3 ft.	22.00 to 22.50
Steel rails under 2 ft.	22.50 to 23.00
Angle bars steel	21.50 to 22.00
Cast iron carwheels	20.00 to 20.50
Railroad malleable	22.50 to 23.00
Agric. malleable	17.25 to 17.75
	Per Net Ton
Iron car axles	24.50 to 25.00
Steel car axles	23.00 to 23.50
Locomotive tires	17.50 to 18.00
Pipes and flues	13.50 to 14.00
No. 1 machinery cast	17.50 to 18.00
Clean auto. blocks	18.00 to 18.50
No. 1 railroad cast	16.50 to 17.00
No. 1 agric. cast	16.00 to 16.50
Stove plate	12.50 to 13.00
Grate bars	13.50 to 14.00
Brake shoes	14.50 to 15.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to $20.50
No. 2 hvy. mltng. steel.	19.00 to 19.50
Low phos. plate	23.00 to 23.50
No. 1 busheling	19.25 to 19.75
Hydraulic bundles	19.50 to 20.00
Machine shop turn.	14.00 to 14.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$19.50 to $20.00
No. 2 hvy. mltng. steel.	18.50 to 19.00
Comb. sheet steel	$19.00 to $19.50
Light bund. stampings	15.50 to 16.00
Drop forge flashings	18.50 to 19.00
Machine shop turn.	12.50 to 13.00
Short shov. turn.	13.00 to 13.50
No. 1 busheling	18.75 to 19.25
Steel axle turnings	18.00 to 18.50
Low phos. billet and bloom crops	24.00 to 24.50
Cast iron borings	13.00 to 13.50
Mixed bor. & turn.	13.00 to 13.50
No. 2 busheling	13.00 to 13.50
No. 1 cupola cast	22.00 to 22.50
Railroad grate bars	15.00 to 15.50
Stove plate	15.00 to 15.50
Rails under 3 ft.	25.00 to 25.50
Rails for rolling	24.00 to 24.50
Railroad malleable	23.00 to 23.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel.	$19.50 to $20.00
No. 2 hvy. mltng. steel	17.50 to 18.00
Scrap rails	21.50 to 22.00
New hvy. b'ndled sheets	17.50 to 18.00
Old hydraul. bundles	16.00 to 16.50
Drop forge flashings	17.50 to 18.00
No. 1 busheling	17.50 to 18.00
Machine shop turn.	13.00 to 13.50
Shov. turnings	14.50 to 15.00
Mixed bor. & turn.	13.00 to 13.50
Cast iron borings	13.00 to 13.50
Knuckles & couplers	24.00 to 24.50
Coil & leaf springs	24.00 to 24.50
Rolled steel wheels	24.00 to 24.50
No. 1 machinery cast.	19.50 to 20.00
No. 1 cupola cast	18.00 to 18.50
Stove plate	16.00 to 16.50
Steel rails under 3 ft.	24.50 to 25.00
Cast iron carwheels	18.00 to 19.00
Railroad malleable	22.00 to 23.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$17.00 to $17.50
No. 1 hvy. melting	15.50 to 16.00
No. 2 hvy. melting	15.25 to 16.00
No.1 locomotive tires	17.50 to 18.00
Misc. stand. sec. rails	19.25 to 20.00
Railroad springs	20.50 to 21.50
Bundled sheets	12.00 to 12.50
Cast bor. & turn.	9.50 to 10.00
Machine shop turn.	9.50 to 10.00
Heavy turnings	13.00 to 13.50
Rails for rerolling	21.50 to 22.50
Steel car axles	22.50 to 23.00
No. 1 RR wrought	13.50 to 14.00
No. 2 RR wrought	16.00 to 16.50
Steel rails under 3 ft.	21.75 to 22.75
Steel angle bars	18.50 to 19.00
Cast iron carwheels	18.75 to 19.25
No. 1 machinery cast	19.00 to 19.50
Railroad malleable	19.50 to 20.00
Breakable cast	16.50 to 17.00
Stove plate	13.00 to 13.50
Grate bars	13.50 to 14.00
Brake shoes	14.50 to 15.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel.	$15.75 to $16.25
No. 2 hvy. mltng. steel.	14.25 to 14.75
Scrap rails for mltng.	21.25 to 21.75
Loose sheet clippings	11.25 to 11.75
Hyd'lic bundled sheets	15.00 to 15.50
Cast iron borings	7.25 to 7.75
Machine shop turn.	8.25 to 8.75
No. 1 busheling	11.75 to 12.25
No. 2 busheling	6.00 to 6.50
Rails for rolling	22.75 to 23.25
No. 1 locomotive tires	18.00 to 18.50
Short rails	23.25 to 23.75
Cast iron carwheels	17.25 to 17.75
No. 1 machinery cast	19.75 to 20.25
No. 1 railroad cast	18.25 to 18.75
Burnt cast	11.75 to 12.25
Stove plate	11.75 to 12.25
Agricul. malleable	16.25 to 16.75
Railroad malleable	19.25 to 19.75
Mixed hvy. cast	17.00 to 17.50

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	.... $16.50
No. 2 hvy. melting steel	.... 15.50
No. 1 busheling	.... 14.50
Scrap steel rails	.... 16.00
Steel rails under 3 ft.	.... 18.00
Rails for rolling	.... 18.00
Long turnings	.... 5.00
Cast iron borings	.... 8.50
Stove plate	.... 11.00
Steel axles	.... 16.50
No. 1 RR wrought	.... 14.50
No. 1 cast	.... 16.50
No. 2 cast	.... 13.00
Cast iron carwheels	.... 15.00
Steel carwheels	.... 16.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	$15.50 to $16.00
No. 2 heavy melting	14.50 to 15.00
Borings and turnings	11.00 to 11.50
Long turnings	9.75 to 10.25
Short shov. turnings	11.00 to 11.50
No. 1 cast	18.50 to 19.00
Automotive cast	18.50 to 19.00
Hvy. breakable cast	15.00 to 15.50
Stove plate	11.75 to 12.25
Hydraul. Comp. sheets	17.50 to 18.00
New busheling	16.25 to 16.75
Sheet clips	14.50 to 15.00
Flashings	15.50 to 16.00
Low phos. plate	19.00 to 19.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel.	$16.00 to $16.50
No. 2 hvy. mltng. steel.	15.00 to 15.50
Hvy. breakable cast	17.00 to 17.50
No. 1 machinery cast.	18.00 to 18.50
No. 2 cast	15.50 to 16.00
Stove plate	13.00 to 13.50
Steel car axles	20.00 to 21.00
Shafting	20.00 to 20.50
No. 1 RR. wrought	14.50 to 15.50
No. 1 wrought long	13.00 to 13.50
Spec. iron & steel pipe	12.00 to 12.50
Rails for rolling	17.50 to 18.00
Clean steel turnings*	10.00 to 10.50
Cast borings*	8.50 to 9.00
No. 1 blast furnace	8.50 to 9.00
Cast borings (chem.)	10.00 to 11.00
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:

No. 1 machin. cast	.... $19.00
No. 2 cast	$16.00 to 16.50

* $1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton:

Breakable cast	$15.00 to $15.25
Machine shop turn.	9.00 to 9.25
Mixed bor. & turn.	7.00 to 7.25
Bun. skeleton long	12.00 to 13.00
Shafting	19.00 to 19.25
Stove plate	12.25 to 12.50
Cast bor. chemical	9.00 to 9.50

Per gross ton delivered consumers' yards:

Textile cast	$17.00 to $21.00
No. 1 machine cast	17.00 to 20.00

Per gross ton delivered dealers' yards:

No. 1 hvy. mltng. steel.	$15.00 to $15.50
No. 2 steel	14.00 to 14.25

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.		Los Ang.	Seattle
No. 1 hvy. mltng. steel	$13.50	to		$14.00
No. 2 hvy. mltng. steel	$13.00			
Bundles	12.00			

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	$12.00	$11.50
No. 1 hvy. mltng. steel.	11.25	10.75
No. 2 hvy. mltng. steel.	9.75	9.25
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.25	6.75
Cast borings	6.75	6.25
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	15.00	14.50

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel.	$16.50 to $17.00
No. 2 hvy. mltng. steel.	15.00 to 15.50
No. 2 cast	15.00 to 15.50
Stove plate	12.50 to 13.00

Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel.	Nominal
No. 2 hvy. mltng. steel.	Nominal
Rail (scrap)	Nominal

Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel.	Nominal
No. 2 hvy. mltng. steel.	Nominal

Construction Steel

. . . STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Lettings decline to 25,500 tons from 35,500 tons last week; new projects of 50,700 tons are the highest this year; plate awards total 1,390 tons.

AWARDS

NORTH ATLANTIC STATES

6500 Tons, St. Georges, Del., bridge over Chesapeake and Delaware Canal, to Phoenix Bridge Co., Phoenixville, Pa.

3000 Tons, New York, Benjamin Franklin High School, to Lehigh Structural Steel Co., Allentown, Pa.

1900 Tons, Queens, New York, Woodrow Wilson High School, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

1000 Tons, New York, apartment building, Park Avenue and 61st Street, to Harris Structural Steel Co., Plainfield, N. J.

726 Tons, New York, bridge over Boston Road, to American Bridge Co., Pittsburgh.

690 Tons, Paterson, N. J., Wright Aeronautical Co. foundry, to Truscon Steel Co., Youngstown, Ohio.

450 Tons, Ashland, Mass., shipping and storage building for Warren Telechron Co., to Bethlehem Steel Co., Bethlehem, Pa.

375 Tons, Evans, Pa., State overpass, to Fort Pitt Bridge Works Co., Pittsburgh.

365 Tons, Pittsburgh, service shop and warehouse for General Electric Co., to Ingalls Iron Works Co., Birmingham.

355 Tons, Irvine, Pa., extension to No. 1 machine shop, to Rogers Structural Steel Co., Corry, Pa.

340 Tons, Stratford, Conn., engineering building addition, United Aircraft—Vought-Sikorsky, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

330 Tons, Carlisle, Pa., Army medical school, to Weatherly Steel Co., Weatherly, Pa.

320 Tons, West Hartford, Conn., factory office and boiler house for Jacobs Mfg. Co., to Lehigh Structural Steel Co., Allentown, Pa.

290 Tons, West Hartford, Conn., die storage building for Pratt & Whitney Co., to Bethlehem Steel Co., Bethlehem, Pa.

215 Tons, Pittsburgh, Letsche Elementary School, to Guibert Steel Co., Pittsburgh.

210 Tons, Richmond, N. Y., public school No. 39, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

200 Tons, Dunkirk, N. Y., highway bridge; Bethlehem Steel Co., Lackawanna, N. Y.

175 Tons, Pearl River, N. Y., American Cyanamid Co. factory building, to Bethlehem Steel Co., Bethlehem, Pa.

155 Tons, Enon Valley, Pa., State overpass, to Bethlehem Steel Co., Bethlehem, Pa.

100 Tons, Broome County, N. Y., State highway bridge, to American Bridge Co., Pittsburgh.

THE SOUTH

1170 Tons, Fredericksburg, Va., Rappahannock River bridge, to Virginia Bridge Co., Roanoke, Va.

648 Tons, Naples, Tex., highway bridge, to Mosher Steel Co., Dallas, Tex.

625 Tons, Fowlerton, Tex., highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.

153 Tons, Emco, Ala., furnace building for Electro-Metallurgical Co., to Ingalls Iron Works Co., Birmingham.

125 Tons, Davidson County, Tenn., bridge, to Nashville Bridge Co., Nashville, Tenn.

125 Tons, Newport News, Va., crane beams for Newport News Shipbuilding & Dry Dock Co., to Bethlehem Steel Co., Bethlehem, Pa.

CENTRAL STATES

1700 Tons, Jeffersonville, Ind., warehouses for War Department, to Gage Structural Steel Co., Chicago.

750 Tons, Proving Ground, Ill., loading line and buildings to Gage Structural Steel Co., Chicago.

350 Tons, Chicago, Fuller Elementary School, to Reuter Bros. Iron Works, Chicago.

330 Tons, Alliance, Ohio, Taylorcraft Aviation Corp. factory and office building, to R. C. Mahon Co., Detroit.

215 Tons, Indianapolis, Ind., hangar for Roscoe Turner Aeronautical Corp., to Central States Bridge & Iron Co.

205 Tons, Hastings, Neb., viaduct, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

150 Tons, Dunn County, Wis., bridge, to Illinois Steel Bridge Co., Jacksonville, Ill.

150 Tons, Cincinnati, mirror plant, to Indiana Bridge Co., Muncie, Ind.

110 Tons, Middletown, Ohio, hangar and buildings for Aeronautical Corp. of America, to Burger Iron Works, Akron, Ohio.

WESTERN STATES

360 Tons, Walla Walla, Wash., Continental Can Co., plant, to Wisconsin Bridge & Iron Co., Milwaukee.

250 Tons, Odair, Wash., 150-ton gantry crane, to Star Iron & Steel Co., Tacoma, Wash.

115 Tons, Phoenix, Ariz., hangars and shop, to Allison Steel Mfg. Co., Phoenix, through William Peper Construction Co., Phoenix.

110 Tons, Fort Peck, Mont., shoring and needle beams, to Des Moines Steel Co., Des Moines, Iowa.

106 Tons, Big Piney, Wyo., State bridge, to Des Moines Steel Co., Des Moines, Iowa.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

15,000 Tons, New York, viaduct No. 5, Rockaway Beach grade elimination for Long Island Railroad Co.

5000 Tons, Brooklyn, subway, contract No. 4, section 5, Atlantic Avenue, for Long Island Railroad Co.

3500 Tons, Washington, gun assembly shop extension; bids taken Sept. 18.

1500 Tons, Quonset Point, R. I., assembly and repair shop for Navy Department.

670 Tons, Pittsford, N. Y., bridge; Foley of Brooklyn, low bidder.

625 Tons, Sidney, N. Y., factory addition for Bendix Aviation Corp.

475 Tons, Trafford, Pa., printing department building for Westinghouse Electric & Mfg. Co.

425 Tons, Erie County, Pa., three highway bridges; Border Building Co., Buffalo, general contractor.

400 Tons, Portsmouth, N. H., new shipways for Navy.

300 Tons, Philadelphia, Poplar housing project; bids taken.

275 Tons, Camden, N. J., copper shop for New York Shipbuilding Corp.

250 Tons, Orchard Park, N. Y., grade crossing elimination; bids Oct. 2.

225 Tons, Macedon, N. Y., highway bridge; bids Oct. 2.

175 Tons, Canaan-Enfield, N. H., State bridge.

165 Tons, New London, Conn., dispensary building for Government.

150 Tons, Northumberland County, Pa., State highway bridge; Moyer Brothers, Altoona, Pa., general contractors.

THE SOUTH

1400 Tons, Morgantown, W. Va., mineral industrial building for West Virginia University.

1100 Tons, Watts Bar Dam, Tenn., TVA steam power plant.

950 Tons, Gilbertsville, Ky., spillway gate rail support towers, etc., for TVA.

400 Tons, Rutledge, Tex., trash racks for Marshall Ford Dam (Invitation 1424-D replacing Invitation 1404-D which was rejected); bids Sept. 25.

365 Tons, Paducah, Ky., factory building for Curtis Lighting Co.

230 Tons, Nitro, W. Va., addition to acid recovery building for American Viscose Corp.

120 Tons, Nitro, W. Va., boiler house addition for American Viscose Corp.

CENTRAL STATES

9000 to 10,000 Tons, Detroit, plant for Ford Motor Co.

3500 Tons, Charlestown, Ind., ordnance plant; bids taken Sept. 18.

1100 Tons, Mansfield, Ohio, warehouse addition for Westinghouse Electric & Mfg. Co.

750 Tons, State of Missouri, six highway bridges; bids Sept. 27.

600 Tons, Chicago, coal handling material for Commonwealth Edison Co.

575 Tons, Rantoul, Ill., two Air Corps hangars, Chanute Field; bids taken.

400 Tons, State of Illinois, six highway bridges; bids Sept. 20.

220 Tons, Council Hill, Ill., bridges for Illinois Central Railroad.

190 Tons, Atchison and Sherwin, Kan., bridges for Missouri Pacific Railroad.

140 Tons, Huron County, Ohio, State bridge over Huron River; bids Sept. 20.

100 Tons, Chicago, subway station, section D2C; M. J. Boyle & Co., Chicago, low bidder.

WESTERN STATES

955 Tons, Los Angeles, Los Angeles River bridge for Los Angeles Junction Railway Co.; bids to United States Engineer Oct. 16.

Weekly Bookings of Construction Steel

Week Ended ——→	Sept. 17, 1940	Sept. 10, 1940	Aug. 20, 1940	Sept. 19, 1939	Year to Date 1940	Year to Date 1939
Fabricated structural steel awards	25,500	35,500	22,000	23,100	703,835	693,475
Fabricated plate awards	1,390	1,065	10,250	430	112,705	115,850
Steel sheet piling awards	2,640	2,285	280	0	36,040	66,680
Reinforcing bar awards	4,410	16,850	10,440	13,700	340,025	340,620
Total Letting of Construction Steel	33,940	55,700	42,970	37,230	1,192,605	1,216,625

460 Tons, Glacier Park, Mont., Two Medicine River State bridges.

142 Tons, Startup, Wash., Wallace River bridge; bids Sept. 24.

FABRICATED PLATES

AWARDS

800 Tons, Long Beach, Cal., gas air mix plant, to Southwestern Engineering Co., Los Angeles, through Oil Feld Construction Co., Long Beach, contractor.

300 Tons, Toledo, Ohio, 10 tanks for Gulf Oil Corp., to Hammond Iron Works, Warren, Pa.

290 Tons, Saltsburg, Pa., crest gates and bulkhead, Loyalhanna Dam, for U. S. Engineers, to American Bridge Co., Pittsburgh.

SHEET PILING

AWARDS

1800 Tons, Buffalo, foundations for Cargill grain elevator; to Bethlehem Steel Co., through James R. Horton, Buffalo.

375 Tons, Flour City, Tex., Naval air training base, to Bethlehem Steel Co., Bethlehem, Pa., through Brown & Root, Inc., Corpus Christi, Tex., contractor.

215 Tons, Toledo, for Standard Oil Co., to Bethlehem Steel Co., Pittsburgh.

132 Tons, Parker, Ariz., United States Indian Irrigation Service (Invitation 103), to Bethlehem Steel Co., San Francisco.

117 Tons, State of Michigan, highway bridge over Muskegon River, to an unnamed fabricator.

PROJECTS PENDING

6500 Tons, Detroit, Ford Motor Co. plant.

Reinforcing Steel

Awards of 4,405 tons; 3,040 tons in new projects

AWARDS

ATLANTIC STATES

300 Tons, Philadelphia, Thrift Park, Inc., parking deck, to Republic Steel Corp., Cleveland, through Truscon Steel Co.; S. H. Levin, contractor.

285 Tons, Philadelphia, Gimbel garage, to Truscon Steel Co., Youngstown, through R. E. Garrick Co.

155 Tons, Ware, Mass., flood control wall, to Joseph T. Ryerson & Son, Inc., Cambridge, Mass., through Warner Bros. & Goodwin, Sunderland, Mass., contractors.

SOUTH AND CENTRAL

310 Tons, Sikestown, Mo., Scott County Milling Co. plant, to Laclede Steel Co., St. Louis, through Jones Hettelsater, contractor.

300 Tons, Newport News, Va., improvements, Newport News Shipbuilding & Drydock Co., to Jones & Laughlin Steel Corp., Pittsburgh, through Dravo Construction Co.

300 Tons, Mobile, Ala., airplane plant repairs, to Truscon Steel Co., Youngstown, through A. J. Rife Co.

275 Tons, Shaker Heights, Ohio, Cedarmount apartment house, to Truscon Steel Co., Youngstown.

120 Tons, Kansas City, Mulberry Street bridge approach, to Sheffield Steel Corp., Kansas City.

100 Tons, Cement City, Mich., building for Consolidated Cement Corp., to Calumet Steel Co., Chicago Heights, Ill.

WESTERN STATES

500 Tons, Walla Walla, Wash., Mill Creek Dam, to Poole & McGonigle Steel Co., Inc., Portland, Ore., through Parker-Schram, Portland, and Eaton & Smith, San Francisco, joint contractors.

390 Tons, Los Angeles, building for Treasury Department, to Truscon Steel Co., Youngstown.

250 Tons, Los Angeles, San Fernando reservoir improvement for Department of Water and Power (Specifications 3451), to Soule Steel Co., Los Angeles, through J. F. Shea Co., Inc., Los Angeles, and Clyde W. Wood, Los Angeles, contractors.

250 Tons, Los Angeles, office building addition for Southern California Gas Co., to Truscon Steel Co., Los Angeles, through P. J. Walker, Los Angeles, contractor.

175 Tons, Mesa, Ariz., underpass, to Allison Steel Mfg. Co., Phoenix, Ariz., through Daley Corp., San Diego, contractor.

148 Tons, Coyote Wells, Cal., highway work, to Ceco Steel Products Co., Los Angeles, through Denni Investment Corp., Wilmington, Cal., contractor.

129 Tons, Orange, Cal., Santiago Creek bridge, to Blue Diamond Corp., Los Angeles, through Werner & Webb, Los Angeles, contractor.

120 Tons, Los Angeles, Aluminum Co. of America plant, to Soule Steel Co., Los Angeles.

CANAL ZONE

300 Tons, Balboa, wharf and administration building, to Joseph T. Ryerson & Son, Inc., Chicago, through Hegeman, Harris, Inc., New York, contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

750 Tons, Lawrence, Mass., housing project.

500 Tons, Buffalo, Cargill grain elevator: H. G. Onstad, Chicago, general contractor.

500 Tons, Jersey City, N. J., Marion housing project; bids in.

225 Tons, Union County, N. J., highway project, route 29, section 2D.

200 Tons, New York, Benjamin Franklin High School, Psaty & Fuhrman, contractors.

167 Tons, Venango County, Pa., paving mesh; Baldwin Brothers, Cleveland, low bidders.

CENTRAL STATES

350 Tons, Chester, Ill., bridge across Mississippi River; bids Sept. 21.

275 Tons, Chicago, subway station section D2C, M. J. Boyle & Co., Chicago, low bidder.

200 Tons, State of Illinois, six highway bridges; bids Sept. 20.

WESTERN STATES

150 Tons, Beverly Hills, Cal., Lyon Van & Storage Co. warehouse; P. J. Walker, Los Angeles, contractor.

Cast Iron Pipe

Northboro, Mass., has under consideration new water mains for West Main Street. Howard Stone is superintendent of water department.

Trustees of Water District, Bath, Me., will close bids this week on a sizable tonnage of pipe. Fay, Spofford & Thorndike, Boston, are engineers.

Charlton, Mass., has called a special town meeting to act on a proposal to purchase about a mile of 8-in. pipe, and a 250,000-gal. standpipe. Howard E. Bailey, 177 State Street, Boston, is engineer.

Neenah, Wis., closes bids Oct. 4 for 4000 ft. of 10-in. pipe, 1500 ft. of 8-in., and 3000 ft. of 6-in., for water system, including fittings.

Alva, Okla., plans pipe lines for water system and other waterworks installation. Surveys and estimates of cost are being made by Alexander & Pollard, Terminal Building, Oklahoma City, Okla., consulting engineers.

Washington Suburban Sanitary Commission, Hyattsville, Md., plans water pipe lines in parts of Prince Georges and Montgomery Counties. A dam will be built across Patuxent River, with reservoir, for supply source. Cost about $1,000,000 and appropriation will be arranged in that amount. Harry Hall is chief engineer.

Bay City, Mich., plans 30-in. pipe for main line from connection with city system to plant of Dow Chemical Co., fronting on Saginaw River, for water supply for industrial service. Cost close to $35,000.

Newport, Ky., plans about 1800 ft. of 8-in. for main supply line from connection with city water system to new water tank at South Newport. Also extensions at pumping station on Ohio River, with installation of motor-driven pumping units and accessory equipment, and clarifying basin. Cost about $100,000. Fosdick & Hilmer, Union Trust Building, Cincinnati, are consulting engineers.

Knoxville, Iowa, closes bids Oct. 8 for 32,500 ft. of 12-in. pipe for main water supply line; also for fittings, venturi meter and meter chamber. Foth & Boyd, 310 Pine Street, Green Bay, Wis., are consulting engineers.

Metropolitan Utilities District, Eighteenth and Harney Streets, Omaha, Neb., W. S. Byrne, secretary, plans pipe lines for water system in districts Nos. 1615 and 1630 to 1636, inclusive, recently created.

Mooresville, N. C., has plans for pipe lines for water system and other waterworks installation. Special election has been called Oct. 15 to vote bonds for $150,000 for this and sewage system. A 200,000-gal. steel standpipe will be installed for water system. R. S. Dickson, 3701 Briarcliffe Place, Charlotte, N. C., is consulting engineer.

Board of Supervisors, Harris County Fresh Water District No. 6, Channelview, Tex., closes bids Sept. 23 for pipe lines for water system and other waterworks installation. Bond issue of $40,000 has been authorized. H. G. Olmsted, Olmsted Engineering Co., 5724 Navigation Boulevard, Houston, Tex., is consulting engineer.

San Francisco, Central Foundry Co., Oakland, Cal., is low bidder on 191 tons of 8-in. pipe (Invitation 2489).

Pipe Lines

Cooper Gas Co., associated with Lone Star Gasoline Co., 1915 Wood Street, Dallas, Tex., has approved plans for new 6-in. welded steel pipe line from gas field near Eldorado, Tex., to San Angelo, Tex., about 45 miles, for natural gas transmission. Company will furnish service to Air Corps training station near latter place and will install control station and other facilities.

Northern Natural Gas Co., Aquila Court, Omaha, Neb., has authorized new welded steel pipe line from Ralston, Neb., to Boys Town, Neb., about 11 miles, for natural gas transmission to last noted place. Connection will be made with company system at first mentioned community. Cost about $50,000.

Tennessee Gas & Transmission Co., Chattanooga, Tenn., will have hearing before Federal Power Commission Sept. 23 on application for permission to build and operate new welded steel pipe line from gas field in northern part of Louisiana to Knoxville, Nashville and other municipalities in Tennessee, and to Asheville, N. C., for natural gas transmission for distribution at these places. Project will include booster stations at points on route.

United States Engineer Corps, Custom House, Philadelphia, asks bids until Sept. 24 for 600 sections of 20-in. inside diameter steel shore discharge pipe, each section 16 ft. 8 in. long (Circular 71).

Southwestern Light & Power Co., Lawton, Okla., plans installation of pressure pipe line distribution system at Temple, Okla., for natural gas service. Cost over $60,000 with control station and other operating facilities.

Center, Tex., plans pressure pipe lines for municipal natural gas distribution, with control station, meter house and other operating facilities, for which surveys and estimates of cost are being made by Freese & Nichols, Capps Building, Fort Worth, Tex., consulting engineers. Service will be furnished by Natural Gas Distributing Corp., Nacogdoches, Tex., which will build a 10-in. welded steel pipe line from natural gas field at Joaquin, Tex., to city limits of Center, about 15 miles, for this purpose. Work on latter project is scheduled to begin soon.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes[2]	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE Standard cokes (Per 100-lb. base box)	$5.00	$5.00	$5.00						$5.10						
BLACK PLATE 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (10)			
TERNES, M'FG. Special coated (Per base box)	$4.30		$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢					2.40¢	2.70¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail)[7]	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES									(Coatesville and Claymont = 2.10¢)						
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.25¢	3.25¢													
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70¢)								
Spring	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)								
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢					2.85¢	2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to 29 gage within certain width and length limitations. [6] For merchant trade. [7] Straight lengths as quoted by distributers. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lots to manufacturing trade. [10] Boxed.

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher f.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the making of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)	*Per Lb.*
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 4/64 in., $3 a net ton higher. Quantity extras apply.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh; Package, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cut nails, carloads	3.85

	Base per 100 Lb.
Annealed fence wire	$3.05

	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	56
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and 6 in. and smaller	68½
Larger and longer up to 1 in.	66
1⅛ in. and longer	64
Lag bolts	66
Plow bolts, Nos. 1, 2, 3, and 7	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	67
9/16 in. to 1 in. inclusive	64
1⅛ in. to 1½ in. inclusive	62
1⅝ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

Semi-fin. hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller	67	70
9/16 to 1 in.	64	65
1⅛ in. through 1½ in.	62	62
1⅝ in. and larger	60	60

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	75 and 10
Stove bolts in packages, with nuts attached	75
Stove bolts in bulk	83½

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $3.40

Small Rivets

(7/16 in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham ..... 65 and 10

Cap and Set Screws

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Sept. 11	Sept. 12	Sept. 13	Sept. 14	Sept. 16	Sept. 17
Copper, Electrolytic[1]	11.50	11.50	11.50	11.50	11.50	11.50
Copper Lake	11.50	11.50	11.50	11.50	11.50	11.50
Tin, Straits, New York	50.10	50.10	50.10	....	50.05	50.05
Zinc, East St. Louis[2]	6.85	6.85	6.85	6.85	6.85	6.85
Lead, St. Louis[3]	4.75	4.75	4.75	4.75	4.75	4.75

[1] Mine producers' quotations only, delivered Conn. Valley. Deduct ¼c. for approximate New York delivery price. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

Tin	New York	Cleveland
Straits pig	51.75	53.25
Copper		
Electro	12.50	12.625
Castings	12.50	12.375
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow, sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	7.95	8.10
Sheets, No. 9 casks	12.50	14.00
Lead		
American pig	6.00	5.40
Bar	7.95	8.00
Cut sheets	8.15	8.15
Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	31.25	31.75
Babbitt		
Anti-friction grade	23.50	21.25

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

Copper	Dealers' Buying Prices	Dealers' Selling Prices
Hvy. crucible	9.00	9.625
Hvy. and wire	8.00	8.375
Light and bottoms	7.00	7.50
Brass		
Heavy	5.00	5.505
Light	4.00	4.750
No. 1 yel. turn.	4.50	5.50
No. 1 red or compo. turnings	7.375	7.875
Hvy. Mach. compo.	7.625	8.250
Lead		
Heavy	4.00	4.375
Aluminum		
Cast	8.250	9.250
Sheet	13.00	14.00
Zinc	4.00	4.750

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 18c.-19c. a lb.; No. 12 remelt No. 2 standard, 18c.-19c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, $181-183 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 12c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33⅓; on brass sheets and rods, 40; on brass tubes, 33⅓, and copper tubes, 40.

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade ..... 2.70c.
Delivered, Detroit ..... 2.80c.

S.A.E. Series Numbers	Alloy Differential, per 100 Lb.
2000 (1.5 Ni)	$0.35
2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.55
2500 (5 Ni)	2.25
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.)	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.)	0.75
x4340 Cr-Ni-Mo	1.65
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.10
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)	2.60
6100 Cr-V bar	1.20
6100 Cr-V spring steel	0.85
Cr-Ni-V	1.50
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
H't strip	17.00c.	17.50c.	24.00c.	35.00c.
C'ld st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

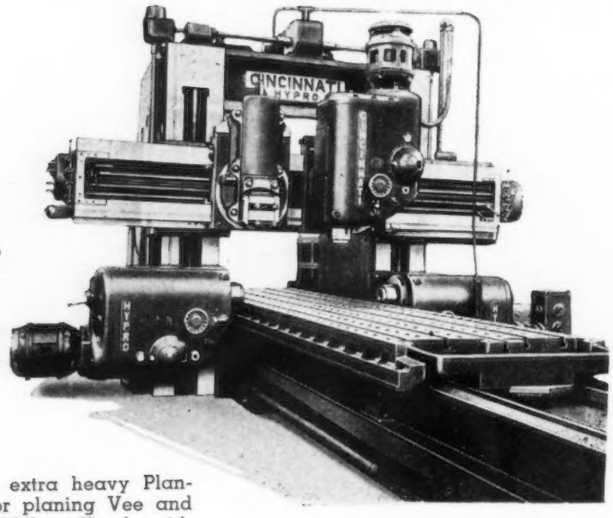
Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago.

Cincinnati

HYPRO

COMBINATION PLANING AND MILLING MACHINES

Planing and Milling with Same Machine on a High Production Basis



Multiple Tools in extra heavy Planing Head used for planing Vee and Flat and rugged Milling Heads with individual 20 H.P. motors, have reduced production time over 50% on grinder beds. This is only an example of time that can be saved with a machine of this type.

Machine illustrated is of entirely new design, incorporating individually driven 9½" Quill Milling Heads providing spindle speeds of 10 to 200 R.P.M. capable of handling cutters over 18" in diameter.

A wide range of planing speeds is provided to the table through separate planer motor and control. Machine can be instantly changed from milling to planing by movement of selector switch or control handle.

If you are interested in placing precision milling and planing on the same machine, the new Hypro Combination Machine merits your close attention.

Full Particulars Sent on Written Request.

Ask for our new bulletin No. 105.

PLANERS · PLANER MILLERS · BORING MILLS

THE CINCINNATI PLANER CO.

CINCINNATI, OHIO

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Dawn	Seamless Hot Rolled	Lap Weld, Hot Rolled
1 in. o.d. 13 B.W.G.	$9.01	$7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.70	10.23	$9.72
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2¼ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extas for less carload quantities:

40.000 lb. or ft. over	Base
30.000 lb. or ft. to 39,999 lb. or ft.	5%
20 000 lb. or ft. to 29.999 lb. or ft.	10%
10.000 lb. or ft. to 19,999 lb. or ft.	20%
5.000 lb. or ft. to 9,999 lb. or ft.	30%
2.000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron pipe)

Base Price=$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
⅛ in.	56	36
¼ to ⅜ in.	59	43½
½ in.	63½	54
¾ in.	66½	58
1 to 3 in.	68½	60½

Wrought Iron	Black	Galv.
¼ and ⅜ in.	+9	+10
½ in.	24	6½
¾ in.	30	13
1 and 1¼ in.	34	19
1½ in.	38	21½
2 in.	37½	21

Lap Weld

Steel		
2 in.	61	52½
2½ and 3 in.	64	55½
3½ to 6 in.	66	57¼
7 and 8 in.	65	55½
9 and 10 in.	64½	55
11 and 12 in.	63½	54

Wrought Iron		
2 in.	30½	15
2½ to 3½ in.	31½	17½
4 in.	33½	21
4½ to 8 in.	32½	20
9 to 12 in.	28½	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
⅛ in.	54½	41½
¼ to ⅜ in.	56½	45½
½ in.	61½	53½
¾ in.	65½	57½
1 to 3 in.	67	60
Wrought Iron		
¼ and ⅜ in.	+10	+43
½ in.	25	9
¾ in.	31	15
1 to 2 in.	38	22½

Lap weld, extra strong, plain ends

Steel		
2 in.	59	51½
2½ and 3 in.	63	55½
3½ to 6 in.	66½	59
7 and 8 in.	65½	56
9 and 10 in.	64½	55
11 and 12 in.	63½	54
Wrought Iron		
2 in.	33½	18½
2½ to 4 in.	39	25½
4½ to 6 in.	37½	24
7 and 8 in.	38½	24½
9 to 12 in.	32	20½

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

SUCCESS STORY
SAW BREAKAGE
Drastically Reduced
Sales, customer good-will and profits jumped when a smart band saw manufacturer tried Ampco Metal for troublesome saw guides. Hardened steel had been galling and sticking, causing excessive breakage of blades. . . . AMPCO METAL reduced breakage drastically and improved performance.

How can *AMPCO METAL* Serve You?

ARE there places in either your product or your production tools where ***metal failure*** is causing trouble? . . . If so, AMPCO METAL can help you . . . as it has helped an impressive number of prominent manufacturers. There's no other bronze like it. AMPCO METAL is unequalled in its resistance to wear, impact, fatigue, and corrosion. It can be supplied in a wide range of properties and forms.

WRITE FOR DATA

Tell us what you're up against, and we'll send complete data sheets and recommendations.

AMPCO METAL, INC.
Dept. IR-919
MILWAUKEE, WISCONSIN

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bassemer, 51.50%.. $4.75
Old range, non-bessemer,51.50% 4.60
Mesaba, bessemer, 51.50%.... 4.60
Mesaba, non-bessemer, 51.50%. 4.45
High phosphorus, 51.50%..... 4.35

Foreign Ores*

C.i.f. Philadelphia or Baltimore, Exclusive of Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe .....12c.
Caucasian, washed, 52% Mn.....60c.
African, Indian, 44 to 48% Mn...51c.
African, Indian, 49 to 51% Mn.. 56c.
Brazilian, 46 to 48% Mn.....53c.
Cuban, del'd, duty free, 51% Mn.72c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered.....Nom.
Tungsten, domestic scheelite, delivered .....Nom.
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade).....Nom.
Rhodesian, 45% $23.50
Rhodesian, 48% 27.50

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton $40.00
Angle bars, 100 lb. 2.70

F.o.b. Basing Points

Light rails (from billets), gross ton $40.00
Light rails (from rail steel), gross ton 39.00

Base per Lb.

Cut spikes ..... 3.00c.
Screw spikes ..... 4.55c.
Tie plates, steel ..... 2.15c.
Tie plates, Pacific Coast..... 2.30c.
Track bolts, steam railroads... 4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)... 65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneaqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa. Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail .....$20.00 to $21.00
Domestic, f.o.b. Ohio River landing barges .....20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines.. 20.50 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid ... 25.00 to 25.50
Domestic No. 1 ground bulk, 96 to 98%. calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines.... 31.00
As above, in bags, f.o.b. same mines 32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick, at St. Louis..$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois 47.50
First quality, New Jersey..... 52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois 42.75
Second quality, New Jersey... 49.00
No. 1 Ohio 39.90
Ground fire clay, per ton..... 7.10

Silica Brick

Pennsylvania $47.50
Chicago District 55.10
Birmingham 47.50
Silica cement, net ton (Eastern) 8.55

Chrome Brick *Net per Ton*

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa. 50.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester $72.00
Chemically Bonded, f.o.b. Baltimore 61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)..... (—)*
Domestic, f.o.b. Baltimore and Chester in sacks $40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk) 22.00

*None available.

AN ADVANTAGE OF A-E-CO HELE-SHAW FLUID POWER

NEXT time you take a paddle in hand, notice how your canoe responds to a flick of your wrist—and remember—a Fluid Power driven machine responds even more easily to your requirements for speed and power.

At a touch of your fingers you can regulate the speed of a hydraulic mechanism over a wide range, choosing with hair-line precision the speed you want.

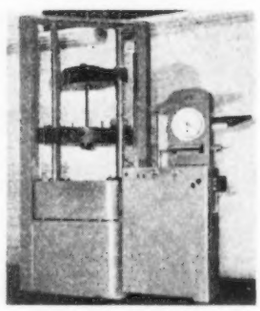
You can vary the pressure from a gentle nudge to a push of authority of 3000 pounds per square inch.

In addition to control, Hele-Shaw Fluid Power (oil under pressure for driving machines) has other advantages — mechanical simplicity, dependability and ease of operation.

You can locate a Hele-Shaw pump anywhere on or off the machine you drive, near it or remote from it. There is no lubrication problem because the Fluid Power system is self-lubricating.

Fluid Powered machines can be controlled manually or automatically for one or a complete cycle of operations.

Look into Hele-Shaw Fluid Power before you design, build or buy machinery. If we do not now have the answers to your questions, we'll gladly put our engineers to work on them.



TINIUS OLSEN TESTING MACHINE CO. drive their 300,000 lb. Hydraulic Universal Testing Machine with a Hele-Shaw Pump. Choose it for convenient and accurate control of speed, and power free from pulsations.

A-E-CO HELE-SHAW Fluid POWER

AMERICAN ENGINEERING COMPANY
2410 ARAMINGO AVENUE, PHILADELPHIA, PA.
Other A-E-CO Products: Lo-Hed Hoists, Taylor Stokers, Marine Deck Auxiliaries.

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload) $120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21% $36.00
Domestic, 26 to 28% 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk) $74.50*
50% (ton lots, packed) 87.00*
75% (carload lots, bulk) 135.00*
75% (ton lots, packed) 151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50% $33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50% $27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon ..... 11.00c.
2% carbon ..... 17.50c.
1% carbon ..... 18.50c.
0.10% carbon ..... 20.50c.
0.06% carbon ..... 21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon $113.00*
2.50% carbon 118.00*
2% carbon 123.00*
1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload $2.00
Ferrotungsten, 100 lb. and less 2.25
Ferrovanadium, contract, per lb. contained V., del'd $2.70 to $2.90†
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots ..... $2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton $142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton $157.50
Ferrophosphorus, electric or blast furnace material, in carloads, fo.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50
Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross tons, $3 unitage, freight equalized with Nashville 75.00
Ferromolybdenum, per lb. Mo, f.o.b. furnace ..... 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace ..... 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

FUEL OIL

No. 3, f.o.b. Bayonne, N. J. ..... 4.10c.
No. 6, f.o.b. Bayonne, N. J. ..... 2.98c.
No. 5 Bur. Stds., del'd Chicago 3.25c.
No. 6 Bur. Stds., del'd Chicago 2.75c.
No. 3 distillate, del'd Cleveland 5.25c.
No. 4 industrial, del'd Cleveland 5.00c.
No. 5 industrial, del'd Cleveland 3.75c.
No. 6 industrial, del'd Cleveland 3.25c.

RODINE

Makes Pickling Efficient

- Stops Waste of Acid and Metal.
- Prevents Over-Pickling.
- Eliminates Acid Fumes.
- Reduces Acid Brittleness.
- Cuts Costs.
- Increases Tonnage.

Bulletin on request

CHEMICALS ACP PROCESSES

AMERICAN CHEMICAL PAINT CO.
DEPT. 309, AMBLER, PENNA.
Detroit, Mich., 6339 Palmer Ave., E. Canadian Branch, Walkerville, Ont.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	$4.50 to $4.75
Foundry, f.o.b. Connellsville, prompt	$5.25 to 5.50
F'dry, by-product, Chicago	10.50
F'dry, by-product, New England	12.50
Foundry, by-product, Newark or Jersey City	$11.30 to $11.90
F'dry, by-product, Philadelphia	11.13
F'dry, by-product, Cleveland	11.05
F'dry, by-product, Cincinnati	10.50
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	$10.75 to $11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export	£17 18s.
Tin plate, per base box	32s. to 33s.
Steel bars, open hearth	£13 9s.
Beams, open hearth	£12 2s. 6d.
Channels, open hearth	£12 2s. 6d.
Angles, open hearth	£12 2s. 6d.
Black sheets, No. 24, gage	£18 17s. 6d. max.*; £18 17s. 6d. min.**
Galvanized sheets, No. 24 gage	£19 10s. max.*; £19 10s. min.**

*Empire markets only.
**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston	***$24.50***	***$24.00***	***$25.50***	***$25.00***	.....
Brooklyn	***26.50***	.....	.....	***27.00***	.....
Jersey City	***25.53***	***25.03***	***26.53***	***26.03***	.....
Philadelphia	***24.84***	***24.34***	***25.84***	***25.34***	.....
Bethlehem, Pa.	$24.00	$23.50	$25.00	$24.50	.....
Everett, Mass.	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.	24.00	23.50	25.00	24.50	.....
Steelton, Pa.	.....	23.50	.....	.....	28.50
Birdsboro, Pa.	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.	24.00	23.50	.....	.....	.....
Erie, Pa.	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.	23.00	22.50	23.50	23.00	.....
Buffalo	23.00	22.00	24.00	23.50	28.50
Cincinnati	***23.44***	***23.61***	.....	***24.11***	.....
Canton, Ohio	***24.39***	***23.89***	***24.89***	***24.39***	.....
Mansfield, Ohio	***24.94***	***24.44***	***25.44***	***24.94***	.....
St. Louis	***23.50***	***23.02***	.....	.....	.....
Chicago	23.00	22.50	23.50	23.00	.....
Granite City, Ill.	23.00	22.50	23.50	23.00	.....
Cleveland	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio	23.00	22.50	.....	23.00	.....
Toledo	23.00	22.50	23.50	23.00	.....
Youngstown	23.00	22.50	23.50	23.00	.....
Detroit	23.00	22.50	23.50	23.00	.....
St. Paul	***25.63***	.....	***26.13***	***25.63***	.....
Duluth	23.50	.....	24.00	23.50	.....
Birmingham	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle	***27.50***	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....
Montreal†	27.50	27.50	.....	28.00	.....
Toronto†	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fce. $22.50

CHARCOAL

Lake Superior fce. $27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pittsburgh	Chicago	Cleveland	Philadelphia	New York	Detroit	Buffalo	Boston	Birmingham	St. Louis	St. Paul	Milwaukee	Los Angeles
Sheets, hot rolled	$3.15	$3.05	$3.15	$3.35	$3.38	$3.23	$3.05	$3.51	$3.45	$3.18	$3.30	$3.48	$4.30
Sheets, cold rolled	....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	....	4.12	4.35	4.43	6.50
Sheets, galvanized	4.75	4.60	4.42	4.50	4.30	4.64	4.00	4.66	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	....
Strip, cold rolled	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	....	3.41	3.83	3.54	....
Plates	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300	7.20	7.10	7.30	7.31	7.35	7.42	7.10	7.50	....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300	8.15	8.15	8.15	8.56	8.59	8.45	8.15	8.63	....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, $3.23.

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- ✓ **LONG, USEFUL LIFE**—with lower charging and maintenance cost.
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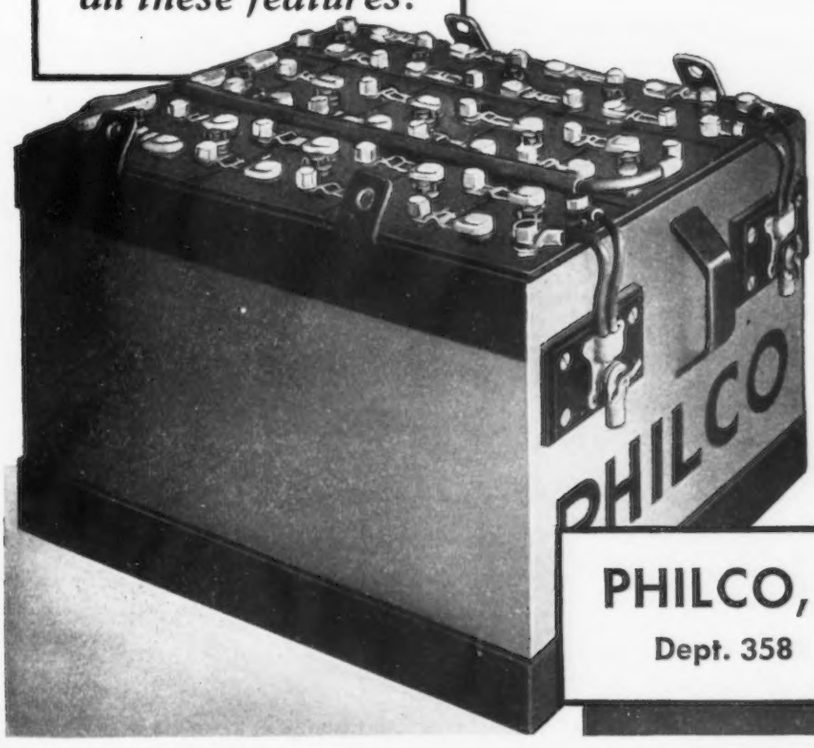

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Sales Possibilities

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North Atlantic

• **General Chemical Co.,** 40 Rector Street, New York, sulphuric acid and other heavy chemicals, has let general contract to W. E. Wood Co., 4649 Humboldt Street, Detroit, for new plant near junction of Detroit and Rouge Rivers, near Detroit, including machine shop, boiler house and auxiliary structures. Cost over $500,000 with equipment.

Continental Can Co., Inc., 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for three-story addition, 100 x 215 ft., to branch plant at Passaic, N. J. Cost close to $225,000 with equipment. W. A. Taylor, company offices at 4633 West Grand Avenue, Chicago, is architect. Company is arranging for expansion and improvements in different plants throughout country, for which a fund of about $15,000,000 will be arranged.

Signal Corps Procurement District, Army Base, Fifty-eighth Street and First Avenue, Brooklyn, asks bids until Sept. 23 for 140,000 ft. of cable and 140 reels (Circular 112).

Republic Aviation Corp., Farmingdale, N. Y., pursuit planes and other military aircraft, plans one-story additions, close to 1,000,000 sq. ft. floor space, for expansion in parts production, assembling and testing divisions. Work will begin soon. Cost about $9,000,000 with machinery.

W. H. Loomis Talc Corp., Gouverneur N. Y., plans one-story addition, about 126 x 130 ft., for expansion in grinding department, storage and distribution. Cost over $50,000 with equipment.

American Car & Foundry Co., 30 Church Street, New York, has let general contract to L. O. Stocker Co., Arcade Building, St. Louis, for one-story addition to branch plant at St. Louis, 130 x 650 ft., primarily for a paint shop, with spraying, conveying and other mechanical equipment. Cost close to $400,000 with equipment.

Westchester Private Flyers, Inc., Dobbs Ferry, N. Y., plans new seaplane hangar at airport, with shop and reconditioning facilities. Cost over $200,000 with equipment.

American Brake Shoe & Foundry Co., 230 Park Avenue, New York, has let general contract to Deakman-Wells Co., 921 Bergen Avenue, Jersey City, N. J., for one-story addition to branch plant at Mahwah, N. J., 50 x 110 ft. Cost over $65,000 with equipment.

Federal Shipbuilding & Drydock Co., Kearny, N. J., has approved plans for expansion and improvements, including reconditioning and modernization of two shipways at yard, idle for a number of years, cost about $350,000; one-story pipe shop, cost $200,000 with equipment; storage and distributing building, cost $750,000 with mechanical-handling and other equipment, and one-story general employment building, $20,000.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., asks bids until Sept. 23 for one 100-ton elevator-conveyor unit (Circular 672-41-606), transformers (Circular 672-41-601), gilding metal strip (Circular 672-41-613).

Henry Disston & Sons, Inc., Unruh and Milnor Streets, Philadelphia, saws, files, tools, etc., has let contract to Robert G. Hoffer, 1520 Locust Street, for five-story and basement addition, 65 x 120 ft. Cost over $175,000 with equipment.

Allegheny Chemical Corp., Womelsdorf, Pa., industrial chemicals, plans rebuilding part of plant recently destroyed by fire, including six one-story buildings for acid plant, lime-sulphur unit, paint department, boiler house, and storage and distributing structures. Loss close to $100,000 with equipment.

Buffalo District

• **Curtiss-Wright Corp.,** 30 Rockefeller Plaza, New York, airplanes, plans new plant near municipal airport, Buffalo, primarily for construction of bomber planes for Government, to be operated in conjunction with Curtiss Aeroplane Division works at Vulcan Street and Kenmore Avenue, Buffalo. Cost over $5,000,000 with equipment.

E. I. duPont deNemours & Co., R. & H. Chemicals Division, Niagara Falls, N. Y., has taken out a permit for three-story and basement addition, 70 x 115 ft., superstructure to begin at once. Cost over $85,000 with equipment.

New England

• **Stamford Rolling Mills, Inc.,** Springdale, Conn., brass, bronze and other metal products, plans one-story addition, 232 x 274 ft., divided into three sections, 72 x 272 ft., and two, 50 x 140 ft., each, for different divisions of production. Cost over $150,000 with equipment. Bids will be asked at once on general contract. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

General Electric Co., Lynn Works, Lynn, Mass., has approved plans for three additions, one story, 65 x 200 ft.; two-story top extension to present building, 80 x 150 ft.; and three-stories and basement, 45 x 112 ft., also one-story addition to boiler house. Cost over $300,000 with equipment.

Manning, Maxwell & Moore, Inc., Nichols and Kossuth Streets, Bridgeport, Conn., valves, gages and other steam specialties, has asked bids on general contract for one-story top addition, 50 x 200 ft., to present five-story building. Cost over $85,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, is architect and engineer.

Wyman-Gordon Co., Madison Street, Worcester, Mass., automotive forgings, has let general contract to E. J. Cross Co., Inc., 150 Prescott Street, for one-story addition, 105 x 300 ft., for expansion in forge shop. Cost close to $150,000 with equipment.

Bridgeport Brass Co., 774 E. Main Street, Bridgeport, Conn., has plans for a one-story manufacturing plant, 130 x 130 ft.

Washington District

• **Glenn L. Martin Co.,** Middle River, Baltimore, airplanes, has approved plans for one-story addition, about 400,000 sq. ft. floor space, for parts manufacture and assembling of large bomber planes. Cost over $2,500,000, of which close to one-half will be expended for equipment. This is first of several additions planned by company, to aggregate over 1,500,000 sq. ft. additional floor space, and represent total investment of close to $20,000,000.

Procurement Division, Veterans' Administration, Washington, asks bids until Sept. 23 for one power-operated pipe-threading vise and stand (Circular M-93); until Sept. 24, one motor-driven floor-sanding machine (Circular M-94).

Consolidated Gas, Electric Light & Power Co., Lexington Building, Baltimore, has approved plans for further expansion at steam-electric power plant at Westport, where extensions are now under way, to include 25,000-kw. topping unit and auxiliary equipment. New project will include a 52,000-kw. turbine-generator unit, high-pressure boiler and auxiliary equipment. Cost over $3,000,000 with equipment. Award for generator has been let to General Electric Co., and orders for other equipment will be placed soon.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for two one-story storehouses at fleet supply base, Oakland, Cal. (Specifications 10034); until Sept. 25 for stack at power house, same place (Specifications 9976). Bids will be asked soon for oil-fired return tubular boilers, induced draft fan, combustion control equipment, fuel oil pumping and heating equipment, piping, instruments and accessory equipment for power house at naval reserve aviation base, Anacostia, D. C. (Specifications 9944).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 24 for hand lift-trucks (Schedule 3041), motor-driven, floor-type drill presses (Schedule 3111), 20 steel mooring buoys (Schedule 3014), steel shelving (Schedule 3087), jarr rollover and pattern-drawing machine (Schedule 3033), motor-driven, disk-type, single-spindle grinder (Schedule 3050), stacking and tiering machines (Schedule 3048), automatic telephone equipment (Schedule 2049); until Sept. 27, motor-generator sets (Schedule 3105) for eastern and western yards.

South Atlantic

• **National Cash Register Co.,** Dayton, Ohio, plans new one-story factory branch, storage and distributing plant at Miami, Fla., to cost about $50,000 with equipment. R. F. Smith, 2942 S.W. Twenty-seventh Avenue, Miami, is architect. Miami offices of company are at 547 N.E. First Avenue.

St. Marys Kraft Corp., St. Marys, Ga., recently organized with capital of $1,000,000, will be an interest of Gilman Paper Co., Gilman, Vt., Charles Gilman, vice-president, and will begin work soon on new pulp and paper mill on 80-acre tract near St. Marys, fronting on North River. It will include power house, pumping station, machine shop and other structures. Company has purchased line of St. Marys-Kingsland Railroad and will operate in conjunction with mill. Cost over $650,000 with equipment.

South Central

• **East Tennessee Light & Power Co.,** Elizabethton, Tenn., plans rebuilding hydro-electric power plant at Wilbur, Tenn., recently damaged by flood waters. Cost over $90,000 with equipment.

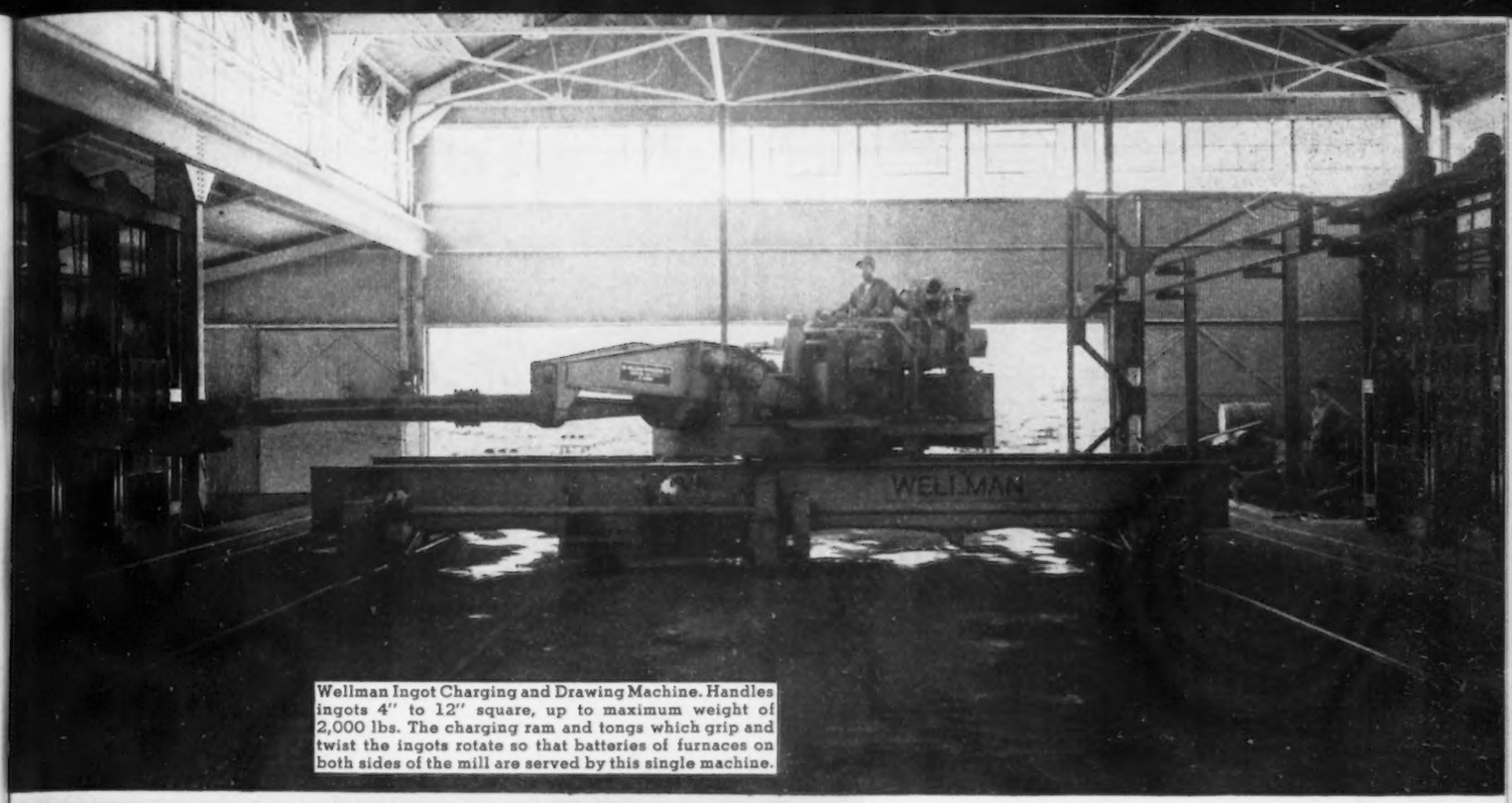
Construction Quartermaster, Southeast Air Depot, Mobile, Ala., asks bids until Sept. 26 for two steel hangars at local airfield. Quartermaster has low bid from A. J. Rife Construction Co., 2808 Maple Lawn Road, Dallas, Tex., at $1,345,000 for main aircraft repair and reconditioning plant at local field, exclusive of equipment.

Indian Refining Co., Circle Tower Building, Indianapolis, has asked bids on general contract for new bulk oil storage and distributing plant at Mount Sterling, Ky., with pumping station, steel storage tanks and other facilities. Cost over $60,000 with equipment.

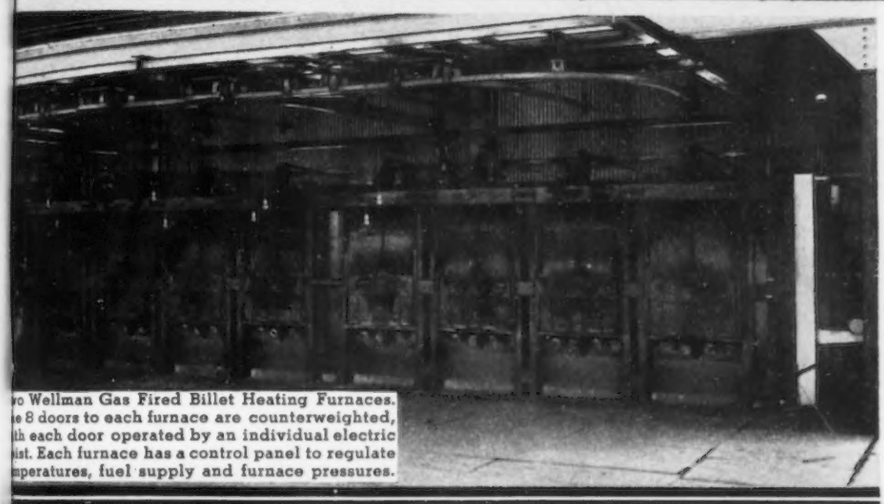
Magnus Metal Division of National Lead Co., Ludlow Highway, Ludlow, Ky., bearing metals, plans one-story addition to replace a structure recently destroyed by fire. Cost close to $50,000 with equipment. Main offices are at 111 Broadway, New York.

Southwest

• **American Zinc Co. of Illinois, Inc.,** Cookson Road, East St. Louis, Ill., subsidiary of American Zinc, Lead & Smelting Co., St. Louis, plans expansion and improvements in electrolytic zinc plant at Monsanto, Ill., recently acquired, including furnace units and

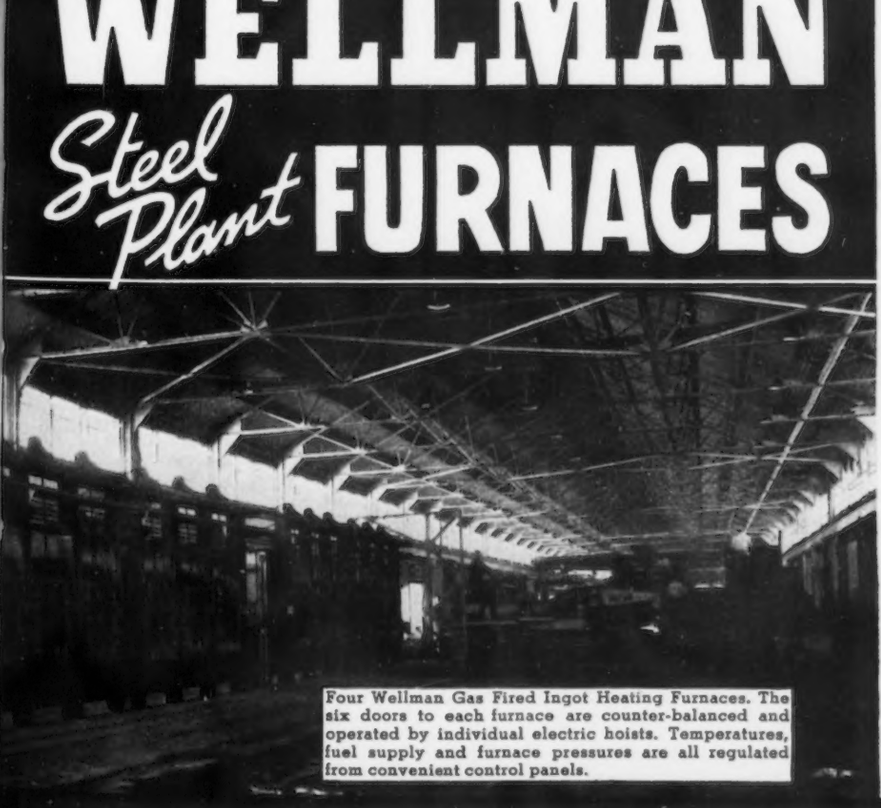


Wellman Ingot Charging and Drawing Machine. Handles ingots 4" to 12" square, up to maximum weight of 2,000 lbs. The charging ram and tongs which grip and twist the ingots rotate so that batteries of furnaces on both sides of the mill are served by this single machine.



o Wellman Gas Fired Billet Heating Furnaces. e 8 doors to each furnace are counterweighted, th each door operated by an individual electric ist. Each furnace has a control panel to regulate mperatures, fuel supply and furnace pressures.

WELLMAN *Steel Plant* FURNACES



Four Wellman Gas Fired Ingot Heating Furnaces. The six doors to each furnace are counter-balanced and operated by individual electric hoists. Temperatures, fuel supply and furnace pressures are all regulated from convenient control panels.

IN THE NEW MILLS OF THE RUSTLESS IRON & STEEL CORPORATION

—the largest plant in the world devoted exclusively to the production of rustless and stainless steel ingots, billets, blooms, slabs, sheet bars, bars, rods and wire.

THESE Wellman Furnaces for the heating of alloy ingots and billets to a rolling temperature of approximately 2100° represent the last word in design, insulation, heat control and automatic operation.

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Other Steel Works Equipment built by Wellman includes: Blast Furnace Skip Hoists; Buckets—"Williams" Clam Shell; Bridges—Ore, Coal Stock and Rehandling; Cars—Ore Transfer, Coke Quenching, Coal Charging, Larry, Ingot, Open Hearth; Car Dumpers—all types; Charging Machines, Cars and Boxes; Coke Oven Machinery—Combination Pushers, Coal Levelers, Door Extractors, Coke Guides, Coal Charging Cars, Quenching Cars; Cranes—Gantry and Special Purpose; Furnaces—Open Hearth, Soaking Pits, Continuous and Reheating, Metal Mixers; Hoists—Blast Furnace Skip, and Mine Hoists; Manipulators—Forging and Special; Producers—Wellman Mechanical Gas and Fuel Feeds for Raw Gas from Bituminous Fuels—Wellman Galusha Generators for Clean Gas from Anthracite and Coke-Breeze Fuels—Flue Systems; Unloaders—Ore Unloaders; Valves—Gas and Air Reversing.

THE WELLMAN ENGINEERING CO.

7008 CENTRAL AVENUE • CLEVELAND, OHIO

other equipment. Cost about $500,000 with equipment. Company also plans extensions and modernization in mill at Fairmont City, Ill., with new roasting equipment and other facilities. Cost close to $300,000 with machinery.

Armour & Co., 18 Central Avenue, Kansas City, Kan., meat packers, have asked bids on general contract for two-story addition, 150 x 200 ft., for expansion in processing department. Cost close to $100,000 with equipment. Main offices are at Union Stock Yards, Chicago; F. A. Lindberg, last noted address, is chief engineer.

Waxide Paper Co., 1525 South Newstead Street, St. Louis, waxed and other processed papers, will ask bids soon on general contract for one-story addition, 50 x 100 ft. Cost about $50,000 with equipment. Leonhard Haeger, 3844 Utah Place, is architect.

Beech Aircraft Corp., Wichita, Kan., has engaged Overend & Boucher, Brown Building, architects, to prepare plans for three main one-story additions, 180 x 640 ft., 100 x 510 ft., and 60 x 210 ft., for expansion in parts production and assembling departments. Cost about $400,000 with equipment.

Magnolia Petroleum Co., Magnolia Building, Dallas, Tex., has let general contract to Cain & Cain, Majestic Building, Fort Worth, Tex., for expansion and improvements in oil refinery at Fort Worth, comprising one and multi-story units for expansion in gasoline division, power house and other departments. New cracking, distilling and other operating equipment will be installed, with additional steel storage tanks, pumping machinery and other facilities. Award has been made to M. W. Kellogg Co., 225 Broadway, New York, for certain processing equipment and contracts for other machinery will be placed shortly. Cost close to $2,000,000 with equipment.

Western Pa. District

• **Aero Supply Mfg. Co.,** 711 West Main Street, Corry, Pa., aircraft screw products, has let general contract to J. M. Benzinger, Inc., 121 West Fourth Street, Jamestown, N. Y., for one-story top addition, 75 x 200 ft. Cost over $70,000 with equipment.

United States Engineer Office, New Post Office Building, Pittsburgh, asks bids until Oct. 14 for two electric gantry cranes, for Loyalhanna Dam, near Saltsburg, Pa., each crane with double main drum-hoist of 64 tons lifting capacity; in addition, crane No. 1 is to be equipped with 50-kw. gasoline-electric generating unit, and crane No. 2 with a 10-ton boom and electric hoists (Circular 77).

Ohio and Indiana

• **Buckeye Forging Co.,** 10003 Harvard Avenue, Cleveland, drop forgings, tank and barrel flanges, etc., has asked bids on general contract for one story addition. Cost close to $60,000 with equipment. Christian, Schwarzenberg & Gaede, 1836 Euclid Avenue, are architects.

Eaton Mfg. Co., 739 East 140th Street, Cleveland, automotive products, has approved plans for one-story addition, about 40,000 sq. ft. floor space, for expansion in motor truck axle-manufacturing division. Cost close to $150,000 with equipment.

Sandusky Foundry & Machine Co., Fulton Street, Sandusky, Ohio, bronze, brass and other metal products, plans one-story addition, for which bids will be asked soon on general contract. Cost close to $50,000 with equipment.

Broden Construction Co., 11730 Harvard Avenue, Cleveland, steel rolling machinery, wire-drawing equipment, etc., has acquired former plant of Euclid Foundry Co., Lakeland Boulevard, Euclid, Ohio, about 20,000 sq. ft. floor space, and will remodel for plant. Present works will be removed to new location and additional equipment installed for increased capacity. Cost over $65,000 with equipment.

Contracting Officer, Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Sept. 26 for steel tubing (Circular 41-524).

Reliance Electric & Engineering Co., 1088 Ivanhoe Road, Cleveland, generators, motors and other electrical equipment, has let general contract to J. L. Hunting Co., Ninth-Chester Building, for one-story addition, about 12,000 sq. ft. floor space. Cost close to $60,000 with equipment.

Link-Belt Co., 220 South Belmont Street, Indianapolis, transmission machinery, plans one-story addition, 76 x 84 ft. Cost about $40,000 with equipment. D. A. Bohlen & Son, Majestic Building, are architects.

Bendix Aviation Corp., South Bend, Ind., airplane wheels, brakes and kindred equipment, plans one-story additions to local plant to advance capacity over 25 per cent. Cost over $1,500,000 with equipment. This is part of general expansion program to be carried out at different plants, with total expenditure to approximate $18,000,000, in which amount company is arranging loan through RFC.

Michigan District

• **Detroit Aluminum & Brass Corp.,** 3975 Christopher Street, Detroit, castings, bearings, etc., has let general contract to Austin Co., Cleveland, for one-story addition. Cost about $45,000 with equipment.

Cogsdill Twist Drill Co., 6511 Epworth Boulevard, Detroit, taps, dies, drills, etc., has let general contract to Trowell Construction Co., 1334 Temple Street, for one-story addition. Cost close to $50,000 with equipment. Paul R. Sewell, 2631 Woodward Avenue, is architect.

Meyers Aircraft Co., Tecumseh, Mich., plans additions to double present capacity in parts production and assembling divisions, providing for output of about 10 complete training planes per month. Cost over $75,000 with equipment.

Isabella Sugar Co., Mount Pleasant, Mich., beet sugar products, will begin superstructure for one-story addition for storage and distribution, for which general contract recently was let to Henry C. Weber Construction Co., Bay City, Mich. Cost over $50,000 with mechanical-handling and other equipment.

Middle West

• **Goodman Mfg. Co.,** 4834 South Halstead Street, Chicago, electric locomotives and parts, coal-mining machinery, etc., has let general contract to Strobel & Hall, 192 North Clark Street, for one-story addition, 125 x 205 ft., for storage and distribution. Cost about $100,000 with equipment. Mundie, Jansen, Bourke & Havens, 39 South LaSalle Street, are architects.

Forgings & Stampings, Inc., 1025 Twenty-third Avenue, Rockford, Ill., has let general contract to Linden & Sons, Inc., 1102 Tenth Street, for one-story addition, 100 x 125 ft. Cost over $85,000 with equipment. Rollin D. Wood, Twenty-fifth Avenue, Melrose Park, Ill., is engineer.

Buda Co., Harvey, Ill., is erecting one-story addition for expansion in diesel engine division, including parts production and assembling, for which general contract recently was let to Continental Construction Co., 340 North Central Avenue, Chicago. Cost close to $325,000 with equipment.

Lake Superior District Power Co., Ashland, Wis., plans expansion in local steam-electric generating station, including new high-pressure boiler unit, capacity about 100,000 lb. of steam per hour, and auxiliary equipment. Cost over $500,000 with equipment.

Dryden Rubber Co., 1014 South Kildare Street, Chicago, general rubber products, has let general contract to Maas Construction Co., Keokuk, Iowa, for one-story addition to branch mill at Keokuk. Cost close to $100,000 with equipment.

City Council, Seymour, Iowa, asks bids until Oct. 2 for extensions and improvements in municipal power plant, including new 225-hp. diesel-type engine-generator unit, fuel tank, pumping machinery and auxiliary equipment. Ralph W. Gearhart, Cedar Rapids, Iowa, is consulting engineer.

Collins Radio Co., 2920 First Avenue, N.E., Cedar Rapids, Iowa, will take bids at once on general contract for new one-story plant, 175 x 340 ft. Cost close to $185,000 with equipment.

Scolding Locks Corp., 1520 Rogers Street, Appleton, Wis., wire goods, has let general contract to Miron & St. Aubin Construction Co., 139 North Story Street, for one-story addition, 25 x 100 ft. Cost about $45,000 with equipment. Lytle & Smith, 112 West College Avenue, are architects and engineers.

Pacific Coast

• **Vultee Aircraft Co.,** 842 Lakewood Boulevard, Downey, Cal., has let general contract to Ford J. Twaits Co., 816 West Fifth Street, Los Angeles, for one-story addition, 200 x 400 ft. Cost close to $400,000 with equipment. Gordon B. Kaufmann, 627 South Carondelet Street, Los Angeles, is architect.

Lake Washington Shipyards, Inc., Houghton, Wash., has let general contract to Atherton Construction Co., Terminal Sales Building, Seattle, for main one-story mechanical and structural shop, 135 x 250 ft., at shipbuilding plant. Cost close to $125,000 with equipment. O. M. Sylliaasen, Dexter-Horton Building, Seattle, is consulting engineer. Company also plans additional shipways, docks and other structures, with modernization and improvements in existing buildings.

Burbank Unified School District, Burbank, Cal., will take bids on general contract early in October for two-story U-shaped industrial arts building, about 30,000 sq ft. floor space, at senior high school, for aeronautics, automobile, general machine and mechanical work, woodworking and other instruction. Cost over $100,000 with equipment. John C. Austin, Chamber of Commerce Building, Los Angeles, is architect.

Combined Metals Reduction Co., Salt Lake City, Utah, has approved plans for new reduction mill at its Caselton mining shaft, near Pioche, Nev., for treatment of lead and zinc ores, to handle about 450 tons of ore per day. Cost over $550,000 with machinery.

Alfred Hart Distilleries, Inc., 1650 East Nadeau Street, Florence, Los Angeles, has let general contract to William O. Gray, 525 West Fourth Street, Downey, Cal., for one-story addition, 50 x 157 ft. Cost over $45,000 with mechanical-handling and other equipment. Louis S. Miller, 721 Carson Street, Long Beach, Cal., is architect.

Canada

• **Canadian National Railways,** 360 McGill Street, Montreal, has let general contract to Bradford & Hoshal, 1170 Yonge Street, Toronto, for addition to engine house at Toronto terminal, Mimico, Ont., with shop facilities. Cost over $75,000 with equipment.

H. Paulin & Co., Ltd., 458 Richmond Street West, Toronto, metal stampings, automotive products, etc., has purchased a four-story building at 10-12 St. Patrick Street, about 16,000 sq. ft. floor space, for plant, expanding present works, which will be removed to new location in October.

Dominion Rubber Co., Ltd., Papineau Avenue, Montreal, has let general contract to Anglin-Norcross Co., Ltd., 874 Sherbrooke Street West, for one-story mill addition. Cost close to $50,000 with equipment. R. E. Bolton is company engineer.

Department of Munitions and Supply, Ottawa, Hon. C. D. Howe, Minister, plans expenditure of $50,000 on addition to factory building on River Street, Montreal.

Hoyle Gold Mines, Ltd., 25 King Street West, Toronto, has plans by H. S. Munroe for a milling plant at Pamour, Ont., to cost $400,000.

Phillips Electrical Works, Ltd., Kingston Road, Brockville, Ont., has awarded general contract to Bremner Norris & Co., 2049 McGill College Avenue, Montreal, for plant to cost about $75,000. J. C. Day, 630 Dorchester Street, Montreal, is engineer.

Dominion Foundries & Steel, Ltd., Hamilton, Ont., has awarded general contract to Frid Construction Co., Ltd., King Street East, for plant addition to cost $600,000. Prack & Prack, 36 James Street South, are architects.